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"Stand still, and consider the wondrous works of God."—JOB.

"Each moss,
Each shell, each crawling insect, holds a rank
Important in the plan of Him who framed
This scale of beings; holds a rank which, lost,
Would break the chain, and leave behind a gap
Which Nature's self would rue."

THOMSON.

"Still, Edward must, to a great extent, have enjoyed a happy life. He was hopeful and cheerful. He had always some object to pursue with a purpose; that constitutes one of the secrets of happiness. He had an interesting hobby; that is another secret. Natural History is one of the most delightful of hobbies."—SMILES.

"If thou art worn and hard beset
With sorrows that thou wouldst forget,
If thou wouldst read a lesson that will keep
Thy heart from fainting and thy soul from sleep,
Go to the woods and hills! No tears
Dim the sweet look that Nature wears."

LONGFELLOW.

"The Will is the Key that opens the door to every path, whether it be of Science or of Nature; and everyone has it in his power to choose the road for himself."—THOMAS EDWARD.

"To me there never has been a higher source of earthly honour or distinction than that connected with advances in Science."

SIR HUMPHREY DAVY.

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ERRATA.

- Page 44, line 3 from top, for "vicicultural" read "viticulural."
 " 45, " " " " "vicicultural" read "viticulural."
 " 156, figs. 1 and 2 are transposed ; fig. 1 represents *N. lenticularis* ;
 " 154, line 15 and 16, for "Myelata" read "Myelata."
 " 156, line 11, for "Myelata" read "Myelata."
 " 203, " 19 and line 3 from top, for "Myelata" read "Myelata."
 " 217, fig. and last line, p. 218, line 28 ; p. 219, line 32 ; p. 220, line 11 ; for "Doryophora"
 " read "Doryophora."
 " 255, line 7 from top, for "aphidius" read "aphidius."

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VARIETY OF SATURNIA CARPINI.

By FREDERICK BOND, F.Z.S.



SATURNIA CARPINI (VARIETY).

THE fine and perhaps unique variety, now figured, of this beautiful species, was bred by Mr. F. Barlow, of Cambridge, from a larva found with many others feeding upon willow on Sawston Fen, Cambridgeshire. In the colour and markings of the specimen there is perhaps nothing worth notice, excepting the absence of the ocellus in each wing, and also of one of the veins in each of the anterior wings. This gives the moth a very remarkable appearance. I was with Mr. Barlow when the larvæ were collected—about fifty in number—and had half of them. I bred from one of them a very curious specimen, a female, which was quite destitute of scales, in fact diaphanous and without markings, though perfect in other respects, and large in size. I gave this specimen to the late Mr. J. F. Stephens, and it is now in the British Museum, in what he called his “metamorphic cabinet.” The rest of the specimens bred were exceedingly fine. I have seven specimens of the brood now in my collection, the largest of which

is a female nearly four inches in expanse. The males are also large, measuring nearly three inches. The markings in all the specimens are very clear and bright, the ground colour rather light, not nearly so dark as some specimens I have from the north of England. I believe all the larvæ found were of the same brood, all being on one large spreading willow, and nearly of the same size.

NEW AND RARE BRITISH LEPIDOPTERA OBSERVED
DURING THE YEARS 1874, 1875, 1876.

By JOHN T. CARRINGTON.

DIVISION I.—MACRO-LEPIDOPTERA.

MANY were the cries of regret when, in an early month of 1874, the "last of the Annuals" appeared. That useful little volume had been conducted by Mr. Stainton with such vigour for twenty years, that we had come to look upon it as an institution, and were selfishly inclined to grumble at its discontinuance; although it had been carried on, I believe, the whole time, at an actual financial loss.

It is difficult to estimate what influence the death of the 'Entomologist's Annual' had upon British Lepidopterists; but, so far as I am aware, there has not been a single Macro-Lepidopteron added to the British fauna since its last issue. I very much doubt whether such a thing has previously happened during any like period in the present century. What is the matter? Where are the Macro-Lepidopterists, who are supposed to outnumber all other entomologists in this country? Perhaps the following reasons may have something to do with the absence of new species.

I have always observed that good seasons produce few novelties; it is the bad years which are really best, when we have to work hard to make a decent show of specimens as autumn comes round. In those unfavourable years we are glad to take anything, like beginners, who have proverbial luck, and pass nothing with—"Oh, it's only that common beast, so-and-so." I reluctantly, but, nevertheless, fear I must, accuse the majority of our Lepidopterists with want of care and observation whilst out collecting. Again,

when our annual holiday comes round we remember where a local species is just out—"Useful for exchange, you know;" so away we go, to devote our whole attention to its capture. No, we never go to an unworked locality, "for fear we shouldn't get any:" therefore we *don't* get additions to our fauna. Someone asks, "Is the fauna exhausted?" How can I believe it is, when there are hundreds of square miles of fine collecting-ground in all three kingdoms where the foot of an entomologist never trod. So far from our having completed the British list of Lepidoptera, there is no reason why additions should not be made to every division, though it be your first love. Where is the new *Erebia*, so long since prophecied from the North of Ireland?

The fashion now seems to be not so much the study of the creatures we take, as that of amassing *big* collections, to be broken up when we are "called over to the majority." These collections have done us no good: they are broken up, sold, again distributed and used for the same purpose by others, who are glad of the chance of "doubling their series." This may be Entomology; but it looks more like acquisitiveness. Moths are, when viewed in this light, perhaps a little better than the "old pots," now the rage; for out of the body of collectors an entomologist may possibly be developed. I cannot see much difference between "collecting," as now followed by so many, insects, china, or postage-stamps; the latter may be best, as one unconsciously learns geography in the process. Do not let us have again to say, "There is no new Macro" in January, 1878; let us rather try to get out of this groove of mere collecting, and more usefully conserve our energies for studying the animals over which we spend so much time.

Although no novelties have been discovered during the past three years, many rare species have turned up. This may not be quite so satisfactory, but is, perhaps, the next best thing; especially where we also know why they were hitherto considered rare. Amongst these are *Zygæna exulans*, *Nola albulalis*, *Eupithecia togata*, *Meliana flammea*, *Nonagria brevilinea*, *Noctua sobrina*, *Pachnobia hyperborea*, *Xylina furcifera*, &c. Most of us now at least possess types of these, while three years ago they were

represented in our collections merely by the label containing their names; especially amongst those of us who prefer waiting, or paying five sovereigns for a *British* example rather than pay threepence in Paris for a type.

The magazines devoted to Entomology have contained the usual amount of reading suited to all parties. The 'Entomologist' has followed its mission of popularising the subject, and thereby gaining recruits; besides sustaining our weaker brethren, who would lose all interest in it without their periodical tonic. The 'Entomologist's Monthly Magazine' is doing very good work as the medium for the collection of descriptions of all the insects in the world, making not unpleasant reading for those interested. The 'Scottish Naturalist,' a quarterly magazine, which ought to be better known, has from time to time had articles of interest not only to Scotch, but to English entomologists. The series of papers in it, entitled "*Insecta Scotica*," will be of great value for reference when complete. The 'Naturalist' is the organ of several local Natural-History societies: we cannot do better than wish it every prosperity amongst them. With an occasional record in the 'Field,' we have exhausted the serial literature of British Entomology.

I regret, through want of space, this article has had to be divided. The same reason applies to these opening remarks. I should have preferred giving a digest, showing the relative value to the Lepidopterist of each of the three years; but am reluctantly compelled to relinquish the idea after preparation.

The following summary comprises the rarer species of Lepidoptera observed during the past three years. Where the term "visitor" is used, I wish my readers to infer that the subject, though taken in Britain in its perfect state, does not imply that it was introduced in that form. It may have been accidentally brought, in an early stage of development, with exotic plants, or by some other means.

Dana's Archippus.—Messrs. T. E. Crallan and J. Jenner Weir have written interesting articles (*Entom.* ix. 265, 267, where the larva is figured) upon the occurrence of this handsome butterfly in Sussex. Mr. J. T. D. Llewelyn also reports its capture from South Wales (*E. M. M.* xiii. 107). It may become a colonist; time will show.

Pieris Daphidice.—One specimen, taken by Mr. Young, near Southend, August, 1876 (E. M. M. xiii. 108); and one other at Folkestone (Id. xiii. 138).

Argynnis Niobe.—Recorded as British by Mr. Parry and the mythical Mr. Wigan, who were said to have taken a number near Canterbury, in July, 1874 (Entom. vii. 171); the former person again recorded it in 1875 (Id. viii. 183). Mr. Gregson records one as taken at Windermere in 1875 (Id. viii. 82); this is probably a variety of *A. Adippe*, amongst a number of which he took it. This species requires confirmation before admittance into the British fauna.

A. Dia.—An example was undoubtedly taken at Worcester Park, Surrey, in 1872, as recorded by Mr. W. Arnold Lewis (Id. ix. 69). I fear this must be received as only a visitor.

A. Lathonia.—Five, said to have been taken by Mr. Wigan at Broadstairs, September, 1874 (Id. vii. 233); and ten by Mr. Parry, near Canterbury, August, 1874 (Id. vii. 289). The above records must be taken with discretion. One by Mr. Butler, at Hastings (Id. ix. 275). These appear to be all recorded during the three years.

Vanessa Antiopa.—One record only occurs in 1874 (Id. vii. 225); seven were recorded in 1875 (Id. viii.); four in 1876 (Id. ix.). They occurred in the following counties: Hampshire, Gloucester, Surrey, Kent, Essex, Norfolk, Yorkshire, Northumberland, Dumfries, and Antrim.

Pyrameis Virginienensis.—Mr. Bignell reports this interesting foreigner from Plymouth (Id. ix. 255).

Apatura Iris.—Larvæ of (Id. viii. 160, 182). Imagos twice recorded from Kent, July, 1875; fourteen taken in one instance (Id. viii. 219, 291). Twenty-seven taken in Huntingdonshire, 1876 (Id. ix. 230).

Erebia Ligea.—Recorded by Mr. W. J. Mercer as taken by himself at Margate (Id. viii. 198). This seems so improbable that it requires confirmation even as a "visitor." What will next come from the county of Kent?

Lycæna Acis.—From Cardiff comes the welcome news that this scarce butterfly was taken in 1874, again in 1875, and twelve specimens in 1876: twenty-eight specimens in all (Id. viii. 161, 271, *et in litt.*).

Acherontia Atropos.—No example appears in 1874; one only in 1875 (Id. viii. 225), which was taken by a waiter

in the Red Lion Tavern, Westminster: about this there were some amusing lines in 'Punch.' Three are reported in 1876: one from Folkestone (Entom. ix. 276), one from Berwickshire (E. M. M. xii. 188), and the other from Exeter (Id. xiii. 138). We might have thought that this moth was growing scarce again, had I not a manuscript note of its frequent occurrence this year, in larval state, in Cheshire.

Sphinx Convolvuli.—In 1874 we have only two records (Entom. vii.); but in 1876 we have no less than one hundred and ninety examples noted: the 'Entomologist' (vol. viii.) has one hundred and seventy-three records, and the 'Entomologist's Monthly Magazine' (vols. xi., xii.) contains seventeen records. The larva is described in the 'Entomologist' (vol. viii. p. 273). There are only sixteen records in 1876: eight each, in 'Entomologist' (vol. ix.) and 'Entomologist's Monthly Magazine' (vol. xiii.). These were taken in every part of Britain and Ireland, from the Orkneys to Land's End.

S. Pinastri.—Is reported from Harwich, by Mr. Higgins, to the Entomological Society (Entom. vii. 46). I have also two manuscript notes: one from the Eastern Counties, where it was bred; the other from Deal, where it graced a baker's pump! In both these instances good drawings accompanied the record. Still I hesitate to place this species in our British fauna.

Deilephila Galii.—Is twice recorded from Norwich, in 1875—6 (Id. viii. 198, ix. 258).

D. Lineata.—Mr. Evan John reports a single capture of this moth from Glamorgan (E. M. M. xii. 44).

D. Euphorbiæ.—Mr. Higgins says this species was taken in 1872, near Harwich (Entom. vii. 46).

Charocampa Celerio.—Occurred in Sussex in 1875, and again in 1876 (Id. viii. 53, ix. 231); also at Berwick and Edwinstowe (Id. ix. 276).

C. Neri.—One captured in a garden in the middle of the town of Lewes, September, 1874 (Id. vii. 290). Taken in a garden at Hemel Hempstead, October, 1876 (E. M. M. xiii. 135).

Seia chrysidiformis.—Once noticed only in 1874 (Entom. viii. 81). Our readers must not imagine for that reason it has not occurred. I know considerable numbers are each year bred from larvæ found on the South Kent coast.

S. ichneumoniformis.—Taken somewhat commonly by Mr. C. G. Barrett, near Pembroke (E. M. M. xii. 182).

S. muscæformis.—Also found near Pembroke, a new locality, by Mr. Barrett (E. M. M. xiii. 92). This species also occurred commonly on rocks at Plymouth this season (*in litt.*).

S. allantiformis.—This rare moth was taken, July 15th, 1876, near Tring (Entom. ix. 204).

Zygæna exulans.—I had the great pleasure of taking this moth, through the kindness of Dr. White, in its only known British habitat, Braemar, in July, 1875.

Nola centonalis.—Another Kent capture! Wigan (Entom. vii. 205).

N. albulalis.—To Messrs. Farn, Bird, and Porritt, many of us were indebted, in 1874, for examples of the hitherto rare *Albulalis*, when it was turned up in considerable numbers in North Kent (Id. vii. 181). It has since been taken each season, but not in such numbers as in that year (Id. viii. 291, *et in litt.*).

Lithosia quadra.—During July, 1875, this species was of most erratic appearance. Of course it was taken in the New Forest, but also at South Shields, Redcar, and, more strange still, at Askham Bog, near York, where it has never previously been seen, although the locality has been systematically worked for fifty years (Id. viii. 85, 196, and 199).

Deiopeia pulchella.—Ought now to be described as a local rather than a rare moth: eleven were taken in 1874, twenty in 1875, and at least eighteen in 1876 (Id. vii. viii. ix.; E. M. M. xi. xii. xiii.; and 'Field' for those years, &c.).

Callimorpha Hera.—Mr. S. Stevens exhibited, at the Entomological Society, a specimen said to have been captured at Dover (Entom. ix. 263).

Cnethocampa pityocampa.—T. Batchelor, of Southborough, Kent, and W. Peyton, Seal, near Sevenoaks, introduced this species as British (Id. vii. 81). For a time many entomologists believed in their British origin, but I doubt if I could now find one who still does so.

Endromis versicolora.—I captured a fine female at Rannoch, May, 1874.

Epione vespertaria.—Recorded (Entom. viii. 280) as taken near Waltham Cross. This I think must be an error, as have

been all other records coming elsewhere than the old locality at York. It is quite possible this species may pass from our Fauna, as the waste ground upon which it occurs may shortly be put into cultivation.

Ennomos Alniaria.—From near Dover is recorded the rearing of two examples of this large Geometer, by the Rev. E. Austin, in 1876 (Entom. ix. 278).

Bolitobia fuliginaria.—This frequenter of dark corners was recorded in 1874 as being taken at Blackfriars Railway Station; a sufficiently dark and dingy locality (Id. vii. 96).

Geometra smaragdaria.—Mr. A. Hodgson reports three specimens from near Sheerness in 1873 (E. M. M. x. 180).

Acidalia contiguaria.—Taken sparingly in North Wales in 1874—5—6, by Mr. Capper. This year has been bred by Mr. Joseph Sidebotham (*in litt.*).

A. degeneraria.—I hear this species has been again taken in its old habitat, Isle of Portland (*in litt.*).

Macaria alternata.—At Christchurch, Hants, one only, 1876 (Entom. viii. 278). Mr. John T. D. Llewelyn took two in 1874 (E. M. M. xi. 158). I hear "this species is not unfrequently taken between Bristol and Exeter" (*in litt.*).

Sterrhia saccharia.—Mr. Llewelyn again reports one female in 1874, from what may be called a head-quarters of this lovely species. More have been taken in his neighbourhood, Neath, I believe, than elsewhere in Britain, (Entom. vii. 260).

Emmelesia taniata.—Mr. Joseph Sidebotham tells me that it was in abundance in a wood near Silverdale, North Lancashire.

E. blandiata.—Mr. H. Jenner-Fust gives a new locality for this species, Glamorganshire (E. M. M. x. 179).

Eupithecia consignata.—Several taken at light in Cambridge; also bred in same town (Entom. viii. 132).

E. extensaria.—A casual visitor from Northern Russia, captured at Hull and reported by Mr. Prest (Id. viii. 109). This has no *locus standi* in the British fauna.

E. subumbrata.—Mr. Hodgson took it frequently near Sheerness in 1873 (E. M. M. x. 180).

E. trisignata (♀).—Mr. Prest sends me some specimens for identification, it may be a variety of this species; of this I may have more to say later.

E. Knautiata, Gregson.—Mr. C. S. Gregson described a

moth under this name (Entom. vii. 255). I need scarcely remind my readers that there has been considerable discussion over this species. So far Mr. Gregson seems to have failed to convince the majority of entomologists that this moth is distinct from *E. minutata*.

E. subciliata.—Reported from central Yorkshire by Mr. Porritt (E. M. M. xiii. 108). Also from same locality by Messrs. Prest and Smethurst.

E. togata.—Sir Thomas Moncrieffe, and his assistant, W. Herd, had the good fortune to discover the habits of the larva of this fine moth in 1875. The Rev. H. Harpur Crewe graphically describes it (Entom. viii. 297).

E. debiliata.—Has been taken in some numbers this season near Burnt Wood, in Staffordshire, by two Liverpool collectors.

Melanippe tristata.—The late Mr. Doubleday (Id. viii. 141) points out the probability of the nearly allied *M. lactuata* occurring with this species in Scotland; has any one yet observed it?

Camptogramma fluviata.—Is reported from Limerick, which is, I believe, a new station for this species (Id. viii. 89).

Phibalapteryx lapidata.—I took a fine series of this species at Rannoch in 1875. I hear that it has also been taken this season by two collectors sent to the same locality by Mr. Fry; by Mr. Fetherstonhaugh in West of Ireland in 1875; by Sir Thomas Moncrieffe in Argyleshire in 1875 (*in litt.*).

Cidaria reticulata.—I may almost say has been “rediscovered” by Mr. Hodgkinson in its former habitat, Windermere. It is twenty years since the last had been taken (Entom. ix. 207).

(To be continued.)

NEW AND RARE HEMIPTERA OBSERVED DURING THE YEARS 1874, 1875, 1876.

By F. BUCHANAN WHITE, M.D., F.L.S.

“WHAT’S in a name?” wrote the immortal William: had he been an entomologist of the present day he would have seen cause to change his opinion, and have said that

there was a very great deal in a name. To be termed a "fly-catcher," though perhaps savouring a little of contempt, is not so galling to the thin-skinned entomologist as the title "bug-hunter," or such like opprobrious appellation; and this is perhaps one reason why the *Hemiptera* have never been popular among collectors generally. A more probable reason is that, Hemipterists being few and far between, a beginner does not readily meet with that appreciation of his good fortune (when he has made some notable capture) that a collector of *Lepidoptera* does. For example, if A, being a Lepidopterist, catches a *Catocala fraxini*, then C, D, E, F, and all the rest, can appreciate and envy his good luck; but poor B, a hard-working Hemipterist, may get no end of rarities, and on recording *his* good luck, no shout of admiration is elicited from A, C, D, &c., but merely the query, "What the dickens is *that*?" or the remark, "*That's* only a bug, or something of that kind." Most of us like appreciation, and if a little envy is excited at the same time the value of our *Catocala fraxini* is not diminished in our eyes thereby. Possibly, however, there might be more collectors of *Hemiptera* if the method of collecting and preserving these insects was more generally known. A collector of *Lepidoptera* will have, after a time, got most of the species to be found in his locality, and may be expected, consequently, to have more time to devote to other insects. Let me recommend him then to take up the bugs. There are not too many of them, and they vary so much in colour and structure, and in their natural history, that he cannot fail to be interested in them. And besides he runs a very great chance of distinguishing himself by the discovery of species new to Britain, if not to Science, a bit of excitement which few collectors of British *Lepidoptera* may expect to happen to them.

We will suppose, then, that some collector, glowing with the noble ambition to put on record two bugs where only one was known before, determines, not quite perhaps to throw *Lepidoptera* to the dogs, but at least to include *Hemiptera* in his studies. At first he may find a little difficulty in determining whether certain specimens belong to the *Hemiptera* or not, but an examination of the structure of the mouth will at once show him whether he is right, and he

will soon find that he can easily "spot" a bug when he sees it. It is chiefly with beetles that bugs are likely to be confounded, but when it is remembered that beetles have jaws, and bugs have a rostrum or sucking tube which is hinged at the base and tucked under the breast, there ought to be no difficulty in making out the order.

As regards apparatus. Every collector of *Lepidoptera* is already furnished with the greater part of it. A net for sweeping low herbage, and an umbrella or wide-mouthed net for beating bushes and trees into, is already probably in the possession of every collector. For aquatic species a water net must be made or bought.

To kill and carry his captures, let the collector provide himself with one or more wide-mouthed bottles, such as used by Coleopterists. These may be furnished with cyanide of potassium, secured by plaster of Paris (as in the common killing bottle), and some crumpled pieces of paper or a little sawdust (with the dust sifted out of it), to absorb any moisture from the captured specimens. Or the bottle may be provided with some crushed laurel leaves, or crumpled pieces of paper and a little benzoline. On getting home, the specimens should be turned out and set according to the fancy of the collector. That is to say, he may set them in the British way of setting beetles, viz., fasten them to cardboard with gum tragacanth, setting out the legs and antennæ, and taking care not to mess the specimens; or he may pin the larger beasts, and stick down the smaller ones to cardboard by a *small* drop of (the so-called) "liquid glue," placing the legs and antennæ alongside of the body, but not sticking them down. This is the Continental method, and takes much less time, but the specimens do not look so well as those set well by the first method. Finally, he may name his specimens with the assistance of Messrs. Douglas and Scott's 'British Hemiptera,' published by the Ray Society, or Mr. E. Saunders' more recent 'Synopsis,' just published in the 'Transactions of the Entomological Society.'

I need not say anything to the Coleopterist regarding the localities in which to look for *Hemiptera*, for where he finds beetles he will very frequently find bugs. A few words to the Lepidopterist may, however, not come amiss. Briefly, then, let him beat trees and bushes, sweep low herbage, and

search on the ground among plants. Moss, both from dry and damp places, and dead leaves, &c., may often be sifted with advantage, especially from autumn to spring. Sandy and stony banks of rivers, ponds, and lakes, will furnish him with certain species, and the sea-shore with certain others. A few live under the bark of dead trees, many in marshes, and not a few on or in the water. In a word, let the Hemipterist, who wishes not only to deserve but to attain success, look *everywhere*—from the heart of the crowded city even to the azure plains of mid-ocean, and in both he will find *Hemiptera*.

That a great deal remains to be done in Britain is apparent from the fact that a very few workers have added to the list of British *Hemiptera-Heteroptera* upwards of thirty species between January, 1874, and December, 1876, although a great part of the country remains still unexplored. In fact, with the exception of the London district and part of the south and south-east coasts, the bugs of the rest of the country are either not known at all, or only to a slight degree. Next to the London district, the Tyneside and Cheriote district has been perhaps most worked. Scotland has been examined partially, here and there, but no systematic collecting has been carried on throughout the year in any Scottish locality. Very little indeed has been recorded of the Irish bugs.

May the year 1877 be an "annus mirabilis" in the history of British Hemipterology, in adding many recruits to the small band of Hemipterists, and—what is almost an unavoidable sequence—many species to the British Fauna!

I would take this opportunity of asking for help in the shape of contributions of Exotic *Hemiptera*, especially from countries beyond Europe. As may well be imagined, a very great deal remains to be done amongst the extra-European *Hemiptera*, and very few specimens are collected. If it is found inconvenient to pin or set them, they may be preserved in alcohol, care being taken that the bottles in which they are placed are always full of fluid to avoid breakage of the specimens by shaking. A few pieces of paper, to fill up the empty space in the bottle, will be an additional safeguard.

I now proceed to enumerate the *Hemiptera-Heteroptera* added to the British list since January, 1874. As it is only

within the last few months that the first approach to a full list of the British *Homoptera* has been published, I have not considered it advisable to include them in this enumeration.

Sehirus picipes, Fall. (E. Saunders, E. M. M. xii. 154).—Taken by Dr. Power at Esher and Weybridge; by Mr. Wollaston in Lincolnshire, &c.

Orthostira macrophthalma, Fieb. (Messrs. Douglas and Scott, Id. xi. 173).—Taken under moss on Cheviot, by Mr. J. Hardy.

O. nigrina, Fall.—Doubtfully distinct from the preceding (see E. Saunders' 'Synopsis'). I have taken it in Braemar; and Mr. Champion has also met with it in Scotland.

Scolopostethus ericetorum, Leth. (Messrs. Douglas and Scott, Id. xi. 264).—A common species, but formerly confounded with the closely-allied *S. affinis*, Schill.

Rhyparochromus sabulicola, Thoms. (J. W. Douglas, Id. xi. 266).—Sandhills at Deal.

Peritrechus nubilus, Fall. (J. W. Douglas, Id. xi. 267).—Local. The *P. nubilus* of "British Hemiptera" is *P. puncticeps*, Thoms., and is the common British species, but perhaps merely a variety.

Cymus melanocephalus, Fieb. (E. Saunders, Id. xi. 62).—Chobham, Reigate, and probably elsewhere.

Trapezonotus dispar, Stal. (J. W. Douglas, Id. xii. 222).—Darenth.

Acompocoris alpinus, Reut. (E. Saunders, Id. xii. 249).—Taken at Norwich by Mr. T. P. Dossetor; and Mr. Douglas and I found it at Dunkeld last August.

Lopus sulcatus, Fieb. (E. Saunders, Id. xii. 186).—Portsmouth, &c.

Macrocoleus tanaceti, Fall. (E. Saunders, Id. xii. 131).—On tansy at Chobham.

Pilophorus clavatus, L. (Messrs. Douglas and Scott, Id. xii. 100).—On sallow in August, at Lee, &c.

P. perplexus, D. and S.—A new species described by Messrs. Douglas and Scott (Id. xii. 101), and found by them on bushes, near nests of *Formica rufa*, in July and August Mr. Saunders ('Synopsis,' p. 287) thinks this is *P. bifasciatus*, F.

Phytocoris pini, Kirschb. (F. Buchanan White, Scot. Nat. ii. 63; Messrs. Douglas and Scott, E. M. M. xi. 144).—First

taken in Braemar. I met with it afterwards in Rannoch and elsewhere; Mr. Douglas and Dr. Reuter have also taken it; and it appears to be common enough in North Scotland on Scots-fir.

Litosema Douglassi, E. Saunders.—A new species described by Mr. Saunders (E. M. M. xi. 63), and found at Woking on broom.

Allocotus rubidus, Put., var. *Moncreaffi*, D. and S. (Messrs. Douglas and Scott, Id. xi. 146).—A variety of a species and genus new to Britain; taken by the indefatigable Mr. Moncreaff, at Portsmouth. Mr. Saunders ('Synopsis,' p. 294) records both the type and the variety from Woking.

Psallus diminutus, Kirschb. (O. M. Reuter, Id. xiii. 86).—Taken by Messrs. Reuter and Norman on oaks, at Forres. It is common at Perth; and I have specimens from the London district, taken by Dr. Power; so that it is probably common throughout the country, but had escaped identification till detected by Dr. Reuter.*

Pleiodema pinetellum, Zett. (O. M. Reuter, Id. xiii. 85).—Taken by Dr. Reuter on Scots-fir, on Moncreiffe Hill, near Perth. Dr. Reuter showed me these specimens, and subsequently I found it locally common on Kinnoull Hill, near Perth. Mr. Champion has also met with it near Aviemore; so that it is probably not uncommon.

Myrmedobia tenella, Zett. (E. Saunders, Id. xii. 249).—Taken in various places near London, by Messrs. Power and Saunders.

Piezostethus formicetorum, Boh. (F. Buchanan White, Scot. Nat. i. 260; Messrs. Douglas and Scott, E. M. M. xi. 174).—In nests of *Formica rufa*, in Braemar.

Temnostethus nigricornis, Zett. (O. M. Reuter, E. M. M. xiii. 86).—A single specimen taken on Scots-fir, on Moncreiffe Hill, near Perth, by Dr. Reuter. I have taken one on Kinnoull Hill.

Nabis Poweri, E. Saunders.—A new species described by Mr. Saunders (Id. xii. 250). Taken among rushes, at Chobham.

* *Psallus Whitei*, D. and S., though considered by Mr. Saunders ('Synopsis,' p. 292) and others as a variety of *P. variabilis*, Fall., is not unlikely to prove a good species. Dr. Reuter met with it during his visit to Scotland last summer.

N. rugosus, L. (J. W. Douglas, E. M. M. xii. 154).—Lee and Darenth. Probably common in many places.

Salda pallipes, F. (J. W. Douglas, Id. xii. 30).—Hayling Island; Mr. Moncreaff.

S. pilosella, Thoms. (J. W. Douglas, *loc. cit.*).—Common on the coast.

S. opacula, Zett. (J. W. Douglas, E. M. M. xi. 9).—Taken by myself on marshy ground, at about two thousand feet altitude, in Braemar.

S. palustris, Douglas (J. W. Douglas, *loc. cit.* 10).—Southampton, &c.

S. vestita, Douglas (J. W. Douglas, *loc. cit.* 11).—Taken by Dr. Power, at Loch Leven; and by Mr. Hardy, on Tyneside.

S. marginella, Fieb. (J. W. Douglas, *loc. cit.* 142).—Deal.

S. fucicola, J. Sahlb. (J. W. Douglas, *loc. cit.* 143).—Folkestone, &c. Dr. Reuter met with it in the north of Scotland last summer.

Hydrometra aspera, Fieb. (J. W. Douglas, E. M. M. xii. 223).—Taken in Fifeshire, by Dr. Power.

Corixa prominula, Thoms. (J. W. Douglas, *loc. cit.* 224).—Taken in the Hebrides, by Mr. H. Jenner-Fust.

A FEW DAYS IN THE NORFOLK FENS.

By W. H. TUGWELL.

Now that the busy season of collecting is over, save to the diligent pupa-digger, I feel certain that a large majority of the readers of the 'Entomologist' would be glad to see in its pages more frequent notices of local jottings and excursions, as much pleasant reading and at times real information may be picked out of them, to be put into practice on our future trips; so I hope the following account of one of my expeditions may interest some, and tempt other and more experienced entomologists to give us from time to time a few leaves from their journals.

I have for years wished to see and have a little fen collecting,—to invade the native habitat of *Papilio Machaon* in its moist retreat. On July 25th, 1876, I started to realise my desire, and to spend a week at Ranworth Fen. To reach

this place is by no means easy, as it lies out of the main track of any conveyance, between Norwich and Yarmouth, and the nearest point to any railway station being at Brundall, some seven miles distant. I determined to try this route, and risk getting a conveyance of some kind to carry my luggage. Fortunately I found at the station a farmer's cart in waiting, which was going to South Walsham, only a mile from Ranworth. Thence I walked on to the "Jolly Maltsters," where I hoped to be able to find apartments, and to assuage a pretty considerable thirst, created by a blazing July sun, which, after some trouble, I did. I found that I was, as expected, the only visitor in the place. Thus far all had gone well. On reaching the house I had noticed a nice lot of young fowls running about, and cruelly conceived the idea of spitting a couple of them. The landlady consented to do the deed, and to roast them for a five o'clock dinner. Were I inclined to be superstitious, I might perhaps attribute my want of success on this occasion, not, like Coleridge's "ancient mariner," to the killing of the albatross, but to my *foi*el plot.

I started at once to reconnoitre my hunting-ground, or it would be almost more correct to say, hunting-water. A few yards from the house is Ranworth Broad and, opposite or across it, Ranworth Marsh. Possibly many, like myself when I went, have little idea what this fenny country is like; it may not be amiss to briefly describe it. The district here for miles is one extensive flat, through which run small and sluggish streams, on either side of them are thousands of acres of marshy ground, with here and there large open pieces of water, called Broads. Ranworth Broad is about a quarter of a mile long, varying in width from one hundred to two hundred yards: it has a deep belt of reeds and rank vegetation all round the margin, whilst jutting out into the water, and also growing in the middle of it are beds and tufts of *Typha angustifolia*, *T. latifolia*, *Scirpus lacustris*, &c. On the marsh opposite there are thousands of acres of rough, rank herbage, composed of smaller species of reed, meadow-sweet (*Spiræa Ulmaria*), *Valeriana officinalis*, two or three species of willow-herb (*Epilobium*), *Cariceæ*, several of the *Juncaceæ*, or rush family, with a carpet of moss, and marsh-fern (*Lastrea Thelypteris*), also several coarse grasses;

forming together a crop that is annually cut for fodder. The ground is very wet and deceptive, as I afterwards found out to my discomfort. The white and yellow water-lilies look very beautiful on the water; and in the ditches the curious water-soldier (*Stratiotes aloides*), with its prickly-edged leaves, strikes the eye of the visitor. I took a boat out into the Broad, and commenced operations by splitting open the stems of *Typha*, &c., hoping to find the pupa of *Nonagria brevilinea*, which was the principal object of my visit; but after three hours' hard work was forced to conclude that I had not hit on the right plan of action. I found many traces of frass in the stems, but no pupa; and was much puzzled to think where the larvæ had gone to change to pupæ.

While dining, about a cart-load of *Typha* and bullrushes were brought in for basket-making, so I thought that a good chance for a search. I found a pupa almost at once, which augured success; but although I searched the remainder, and the next day went through two hundred bundles more, I did not find another pupa. Unfortunately this one died, so I did not make certain of its species: it was in a *Scirpus* stem.

After dinner I prepared for my first night experience of fen work. Having pulled a boat across the Broad into a ditch overgrown with tall reeds and the two species of *Typha*, I with no small difficulty forced my way up it by means of a punting pole. These ditches would be ugly places to fall into, as in many places they are six to eight feet deep in mud of the consistency of cream, smelling abominably on being disturbed; so I took a dose of quinine and brandy, which I had brought, thinking it might be useful to prevent fever or ague. I then tied up my boat to the bank of the ditch, near an "alder car," where the ground was tolerably firm. I had been advised to search the honeydewed leaves of alder and sallow for *Noctuæ*, but on inspection no honeydew was to be seen, so I applied a little sugar to the leaves instead, and on all the available trees and bushes: I then commenced mothing. *Epione apiciaria* was common, but worn; *Abraxas grossulariata* swarmed in hundreds along the edge of the "car;" *Lithosia muscerda* was more sparing in numbers; *L. griseola* common, with a few examples of its variety *Stramineola*; *Nudaria senex*; *Nonagria despecta* flew in plenty, but were mostly worn; a single specimen of

Crambus adipellus fell to my net; *C. uliginosellus* was very common, but entirely worn out,—useless for cabinet specimens; and one fine male *Geometra papilionaria*. Visiting my sugared leaves I found plenty of moths, but all common; the only species new to me, alive, was *Celana Hawcorthii*,—two specimens were duly bottled, with a lot of *Leucanida*, &c., for morning's inspection; three larvæ of *Simyra venosa* were found on the reeds. As time went on, and moths got more and more scarce, one could realise the solitude,—alone on this boggy fen; and to improve it I dropped suddenly into a water-hole up to my thighs, thus putting out my lamp. Scrambling out as quickly as possible, and squeezing out some of the superfluous moisture, I re-lighted my lamp, and took a short pull at the brandy-flask and a long one at my pipe, from which I got much comfort. Looking at my watch I found it was two a.m., so determined to make for the "Jolly Maltsters." Getting into the boat, I pushed my way back to the Broad. In returning along the ditch I took a few specimens of *Crambus paludellus*, one of which is of a beautiful pure white colour, with spots of black,—in fact as white as *Myelophila cribrella*, one specimen of *Herminia cribralis*, three *Schænobius mucronellus*, and a lot of *Chilo Phragmitellus*. Once on the Broad I found it was not so easy to get home as I imagined; it being still dark it was difficult to hit on the landing-place. However, I got safely to bank. Here hundreds of *Acentropus niveus* were disporting themselves over the water, flying close to, and even settling on, its surface, rising from it again with the greatest ease. It was three o'clock when I reached the house,—pretty wet, of course; but after a good wash and dry rubbing I turned into bed, and was soon fast asleep. The morning examination of captures proved my night's conjectures: only very common species had rewarded my pains. My other nights were pretty much a repetition of my first; the only addition worth notice being a nice dark specimen of *Acronycta leporina*.

The day work was singularly dull,—very little was to be done in the way of captures. I was much pleased to get a few splendid larvæ of *Papilio Machaon*: this grand species appears common here, although this season not so plentiful as in former years. According to the men who work on the

marshes, the local name for the caterpillars here is "canker," or "canker-worm." The larvæ of *Saturnia carpini* and *Chærocampa Elpenor* could be got in plenty by working for them. The flower-heads of Valerian produced *Eupithecia viminata*.

I left Ranworth with very few insects on my setting-boards, and made the following "mem." for future trips:—"Not to go alone; and to have a strong attracting light." This is a most necessary thing for fen working. Probably the great floods that occurred in 1875—just at the time *N. brevilinea* was out, and when the females ought to have deposited their eggs—accounts for my want of success in taking it this season. The men working on the marsh told me that for two or three weeks the marshes were flooded to a great height. At any rate, this year, this insect hardly appeared at all; I only heard of a solitary example being secured, and that a worn one.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LYCÆNA ACIS.—My friend E. P. Breaks and I had the good fortune to capture a dozen specimens of this butterfly, near Cardiff in 1876: they were flying in company with the common blues in June last.—JAMES E. HEATH; Cardiff.

PUPA OF SPHINX CONVULVULI IN THANET.—There have been several notices this autumn of the capture of *S. Convolvuli*, so I conclude it will interest some of your readers to hear that the pupa was dug up in a garden at Birchington, in Thanet, the 17th or 18th of October. It was found by a boy digging potatoes, and sent to me for *Acherontia Atropos*, but there is no doubt about its being *Convolvuli*, from the exaggerated likeness which it bears to *S. Ligustri*; the curved, annulated tube containing the proboscis, measuring nearly an inch and a quarter in length; the pupa is not more than two and a half inches long. Last year, in this same village, the imago abounded, as many as sixty being taken in one garden, whilst this year there were but five: it is a place where one might reasonably expect to find the larva but for the rigid farming, which abhors a hedge and has no pity on the wayside flowers. Possibly the eggs may have hatched frequently

in these parts, and the larvæ perished through the uprooting of the food-plant, before they could come to maturity; I think we may assume this, after the abundance of the imago in 1875. The pupa was a light brown when I received it, and has darkened since; probably when found it had but just changed. Wild convolvulus grew amongst the potatoes where it was found.—H. M. GOLDING BIRD; 45, Elgin Crescent, Kensington Park, November 20, 1876.

NOTE ON THE LARVA OF *POLIA XANTHOMISTA* var. *NIGROCINCTA*.—On the 8th of September, 1875, I visited my breeding cages as usual about six p.m.; I then observed a male *P. nigrocincta* sitting upon the side of the cage. A short time afterwards I again looked, and then found a female in the act of coming out of pupa; I left them in company, which resulted in copulation at about ten o'clock the same evening. After disunion I kept the female; she was very sluggish in her habits: during the day she sat perfectly quiet upon a suitable place of nearly her own colour. On the third night afterwards she deposited her first eggs, about a dozen in number; again, the following night, she laid about a dozen more, and on the sixth night she completed her oviposition, having laid on this occasion 208 eggs during the night. She still lived for several days, but eventually died without laying more eggs. The eggs were pale pink in colour for about three days, when they slowly changed to dirty brown: they remained of this shade until the early part of April of this year, when they became a dark lead-colour, and finally hatched upon the 20th of April. I had previously prepared some young plants of *Plantago maritima*, in flower-pots, for the use of these young larvæ. Without eating their own egg-shells they at once commenced feeding upon the plantain, and fed well until about fourteen days later, when they began to show signs of changing their first skins: this was completed during the next three days, when they again began to feed vigorously. During their first days of active life these larvæ were almost devoid of colour, being so transparent that they were easily overlooked, though in numbers, upon a small plant. However, they soon began to assimilate to the colour of the narrow leaves of the plantain, and were always difficult to identify, from their great resemblance to the stalks of the food-plant. There was very little

variation in intensity of colour, some few only being slightly lighter than their neighbours. The second change began about twenty-eight days after their birth, and was carried through with ease and perfect health. About this time I went for my annual holiday to the Isle of Man, leaving the larvæ feeding well upon growing plants, in six large flower-pots, in which they had plenty of room, and were in the open air, simply covered with muslin. On my return, on the 21st of June, from the island, to my disgust I found large numbers dead, and others dying; this was during what, I expect, was their last change of skin. Removing the dead ones, and otherwise contributing to the comfort of the remaining strong ones, I hoped to save them; but no, they still died, until my last disappeared. The effect was most peculiar, for there was nothing left but loose skins; they seemed to have had something akin to diarrhœa. Of the seven larvæ of the same species I brought from the island, which I fed separately on food from their native locality, I reared four perfect specimens. In other years I have found the same affliction attend young larvæ of *P. nigrocincta*, found in a state of nature. We can only estimate the quantity we shall rear when we get the larva in its last stage, and when it is brown in colour. My chief object in sending these notes to the 'Entomologist' is that they may settle the question of whether or no the larva hybernates. It has been stated that such is the case. This is now proved not to be so. Another season I hope to succeed in rearing this species from the egg to its perfect state.—JAMES LEATHER; Manor Road, Liscard, Birkenhead.

CAPTURES AT WITHERSLACK.—On the 21st of July Mr. Hodgkinson and I went to Witherslack in the finest possible weather, after a long spell of drought. We expected to find a rich harvest of Lepidoptera under such seemingly favourable conditions; but what naturalist could ever truly foretell his success or failure under apparently desirable or adverse circumstances. We did not, as in former years, find anything approaching the vast variety of either Macro- or Micro-Lepidoptera, that flying or at rest absolutely bewildered the eager collector. During the day a hot sun beating down on the parched ground forced everything, except ourselves, to seek shelter; while at night, where the eye could command

yards of heather at a glance, nothing but hordes of gnats and, more terrible, "midges" were visible. Respecting these "midges," I should like to know their scientific name,* which, if in accordance with their habits, must be of terrible significance: blood they will have; even tobacco-smoke being a questionable remedy. The best way to avoid their attentions is to apply neat whiskey constantly to the face and neck with a handkerchief. Comparatively scanty, however, as were the results of the journey, we obtained the real object of the visit, viz. a few *Elachista serricornella*: about sixteen were obtained by very assiduously sweeping a small reddish *Carex* growing in wet places on the peat, five of which fell to my share. The man who gets this insect deserves it, for truly no more heart-breaking pursuit can be imagined. Amongst deep heather—on very rough ground, which here and there becomes wet bog—we swept for hours, with nothing to divert our attention, as, excepting the "midges" and hosts of migrating winged ants, few insects inhabit the same locality as *Serricornella*. *Schrankia turfosalis*, *Crambus margaritellus*, and *Pterophorus Bertrami*, were taken at the same time, along with *Coleophora therinella*. At the plantation the beautiful longhorn, *Nemotois minimella*, was to be found sparingly, about three dozens falling to our joint efforts. In company with it was *Gelechia senectella* and *G. similella*, *Dicrorampha consortana* and *D. acuminatana*, with the "pearl" *Rivula sericealis*, &c. One morning was spent on some broken ground, covered with small rocks, where *Cnephasia penziana*, *Ennychia cingulalis*, *Herbula cespitalis*, *Crambus pinetellus*, and *Elachista dipunctella*, occur. Some green Tortrix larvæ were found in seeds and leaves of columbine (*Aquilegia vulgaris*), from which we have since bred *Cnephasia lepidana*, although we believe these larvæ only crept into the seeds to change to the pupa state; and, as many pupæ are still alive amongst the dried plants, we expect something else to turn out in spring. A *Coleophora*, with a long, bent, brownish case, found on birch (possibly *C. Wilkinsonella*), and a minute *Elachista*, still puzzle us: the latter is assignable

* The "midges," there can be little doubt, were a species of *Culex*,—veritable mosquitoes,—probably *Culex detritus*, which is on the wing during the day, frequently in multitudes, as is also *C. annulatus*.—F. S.

to no known species. In the woods at Grange there were plenty of larvæ of *Nepticula arcuosella* feeding in wild strawberry, and of *N. splendidissimella* in bramble (a more slender and tortuous mine than *N. aurella*); also *N. septembrella*, in its most intricate and almost blotch-like mine, was found in leaves of St. John's-wort. Thus ended a most pleasant trip of three days, which we hope many times to repeat next year.—J. H. THRELFALL; Preston, November 17, 1876.

NOTE ON ORTHOTÆNIA ANTIQUANA.—About the end of April, 1876, when digging in the garden, I noticed the roots of *Stachys palustris* very much swollen. Breaking one or two across, I found they were mined by a small white larva; I kept several of them in a tin box, where they remained until they were full fed: this was about the end of May. Then they came up to the lid of the box, where one of them spun a whitish web, but not finding it to their taste they all went down again among the roots, some spinning among the roots, others sealing up the end of the mine in the roots with silk. The perfect insects came out in June. I fancy the moth will lay its eggs in June or July, and the young caterpillar will mine down the stem into the roots, wounding it and causing a partial thickening, in the same way as *Pterophorus microdactylus* wounds the stem of hemp agrimony; it must feed slowly during the winter months, as it is late in spring before they are fed up. Merrin gives *S. arvensis* as its food-plant, but *S. arvensis* is an annual, and is a seed all the time the larva of *O. antiquana* is feeding.—W. SHAW; Eyemouth Mill, Ayton, Berwickshire, December, 1876.

NOTES ON SOME OF THE GENUS DICRORAMPHA.—Last Easter, when at Witherslack, I collected a good number of the young shoots of the ox-eye daisy (*Chrysanthemum*), then about three inches long; I picked those only that were twisted, feeling sure that the larva was lower down in the root. I have known for years, and have bred nearly all of this genus before, that there are certainly three species from ox-eye, viz., *D. plumbagana*, *D. acuminatana*, and *D. consor-tana*. The habits of the two former species are similar, and have a continuity of broods. I have bred *D. acuminatana* from the middle of May until the end of August, all appearing from larva collected from the beginning of April until the

middle of May. The only difference in the feeding of the larva and the time is with *D. consortana*: the larva of this species is quite six weeks later, say the first week in June, when the ox-eyes are about nine inches high: then by the distorted shape of the stem you may readily find the larva near the top of the plant, and it is only single-brooded, appearing not earlier than the first week in July. I have noted where only small patches of ox-eye grow on the sea-bank, near Fleetwood, all of the three species occur, and I never find them anywhere else. I have taken and bred some scores this season of all these. As to *D. herbosana* I found it where there are no ox-eyes growing—at least, only odd plants—this season, on the road-side, near the inn at Witherslack. I may say, that while the former species abounded, I could only take a score of *D. herbosana* about six o'clock on a fine evening, on the bare road-side. Still, the wind might have blown them out of the fields, no great distance off, and the setting sun just made them active in this particular spot. *D. plumbagana* is a rarer species down here; I am not quite sure whether it occurs at all. I have specimens of my own setting, but cannot remember where I captured them.—J. B. HODGKINSON; Preston.

NEMATUS RIBESII (VENTRICOSUS) AND N. CONSOBRINUS.—Dr. Snellen van Vollenhoven finds the larva of the former species on "currant," and that of the latter on "gooseberry" (Entom. ix. 247); with me, the larvæ of both insects feed on both plants.—J. E. FLETCHER; Pitmaston Road, Worcester.

ANSWERS TO CORRESPONDENTS.

A. W. ROSLING.—NAME OF BEETLE.—Would you kindly name the beetle, which I have tried to draw? It is black, and punctured almost all over. It was taken by a young friend of mine, near Southampton.

[From the description, the insect is, I think, an *Onthophagus*, probably *O. ovatus*; but it may possibly be a much rarer thing, *Odontaus mobilicornis*. I cannot tell for certain without seeing it.—JOHN A. POWER.]

H. H. CORBETT.—We cannot undertake to name the *Eupithecia* without seeing them.—ED.

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THE OCCURRENCE OF *MELITÆA DIDYMA* IN THE SOUTH OF SCOTLAND.

By J. JENNER WEIR, F.L.S., F.Z.S.



MELITÆA DIDYMA.

It has been a matter of surprise to me that so few species of the genus *Melitæa* are known to be indigenous to the British Isles. Mr. Kirby, in his 'Manual of European Butterflies,' gives a list of sixteen found within the limits of Europe: of these but three have been detected in this country. All are gregarious in their habits and extremely local in their distribution, so much so that but few Lepidopterists have taken all three of them, although in the localities frequented they are usually found in considerable plenty.

Mr. W. Lennon, of the Crichton Royal Institution, Dumfries, has sent to the Editors of this magazine a specimen of *Melitæa Didyma*, which he states he captured some years ago within a few miles of Dumfries, in company with *Argynnis Euphrosyne* and *Selene*, which on the day of the capture, to use his own words, were in "such swarms" as he had never before witnessed. He at the time considered the insect a fine variety of one of the two species

mentioned; and having since paid more attention to *Coleoptera* he had not made a proper examination of the specimen. Lately he has again devoted himself to the study of the *Lepidoptera* of his district; and upon more carefully examining the specimen in question he observed that it was totally different from anything he had previously noticed, and therefore forwarded it to London for identification. He states that he captured the insect in the neighbourhood of woods, composed of Scotch fir, birch, and hazel; and that in the exact spot of its capture was a plentiful growth of sweet gale, blackberries, and *Vaccinia*. The larva of the insect feeds on *Artemisia*, *Centaurea*, *Linaria*, *Teucrium*, *Plantago*, *Veronica*, and *Stachys*.

The specimen is a male, apparently but just emerged from the chrysalis, with the right wings in a somewhat crumpled state.

Melitæa Didyma is of wide distribution on the Continent, being found in Russia, France, Germany, Switzerland, Italy, and Spain. I have specimens of the insect in my cabinet from Poltawa and Kief, and have taken it myself in the Alps. The Scotch specimen is very closely similar to a male which I captured in Switzerland, a few hundred feet above the English church at Zermatt, and partakes more of the usual appearance of the insect from alpine districts than those found in lower grounds.

This species of *Melitæa* is an ally of *Cinxia*: like that insect the under side of the hind wings has large, black, basal spots. Staudinger states that the insect is "*valde varians et aberrans*." The male has the wings on the upper side of a bright reddish fulvous; fore wings with a row of black spots on the hind margin, and another in the centre, and several other black spots; hind wings with a marginal row of black spots, and other indistinct scattered black markings: under side—fore wings pale fulvous, with similar markings to those on the upper side, tip straw-colour, fringes spotted with black; hind wings straw-colour, with two distinct reddish bands separated with rows of black spots, fringes spotted with black. The female has all these colours and markings more subdued, and the fulvous suffused with fuscous: in alpine varieties the black is slightly tinged with greenish.

The neighbourhood of the Solway Firth, where this insect

was captured, enjoys a very mild climate, and is well sheltered from the north by the Cheviots. The insect appears on the wing early in July, and in mountainous districts as late as the middle of August.

Mr. Lennon proposes to make a further search this year for the insect, and I have little doubt will succeed in establishing its claim to be considered a British species.

The figure represents the upper side of the specimen, taken Mr. Lennon in Scotland, although it has not been thought necessary to depict the crumpled wings.

NEW AND RARE BRITISH GALL-PRODUCERS OBSERVED SINCE THE YEAR 1872.

By EDWARD A. FITCH.

THE following additions may be made to Müller's list, which appeared in the 'Annual' for 1872. Some remarks were made thereon by Rev. T. A. Marshall, in the volume for 1874 (Annual, pp. 115—117). The arrangement accords with that in the above-mentioned catalogue, to which this forms a supplement.

CYNIPIDÆ.

Dryophanta scutellaris, Oliv.—Our well-known cherry-galls belong to this species, and not to *D. folii*, L. (Entom. ix. 121).

Aphilothrix solitaria, Fonsc. (= *ferruginea*, H.) (Entom. viii. 169).—In addition to the localities given in the 'Entomologist,' this gall has occurred in Middlesex, Surrey, and Essex. It is no doubt generally distributed.

A. globuli, H. (Entom. viii. 254).

A. autumnalis, H. (Entom. viii. 255; E. M. M. xii. 226).—I have now learned to differentiate satisfactorily this and the preceding species, both of which occur in oak-buds in the autumn. Mayr's descriptions are found to be excellent, when the two galls are compared. Recorded from Perthshire (P. Cameron).

A. collaris, H. (Entom. viii. 289).—The galls described by Schlechtendal (Ent. Zeit. xxxi. 396, 397), under the names *Cynips tegmentorum* and *C. fasciata*, belong to this species.

A. albopunctata, Schl. (E. M. M. xi. 110).—This species

is widely distributed in England, but I have no record further.

A. callidoma, H. (Entom. viii. 290).—I now find this rather variable gall in some abundance in the autumn; such is also the case in the neighbourhood of Nottingham (G. B. Rothera) and Isleworth (E. A. Ormerod).

A. glandulæ, H. (Entom. ix. 1).

Cynips Kollari, H.—Our common British oak-nut is the produce of this species. *Lignicola* is not known as indigenous, but there is no reason why it should not occur (Entom. vii. 241, 265).

Neuroterus laeviusculus, Schenck. (= *pezizæformis*, Schl.).—The galls of this species have been recognised in Middlesex and Surrey (E. A. Ormerod), Essex (E. A. Fitch), and Nottinghamshire (G. B. Rothera).

Andricus testaceipes, H. (= ? *A. noduli*, H.) (Entom. ix. 219).

A. æstivalis, Gir. (E. M. M. xii. 226).—The gall has not been found. Mr. Cameron took an *Andricus*, near Loch Lomond, in May, which is doubtfully referable to this species.

A. amenti, Gir. (E. M. M. x. 85, and Scot. Nat. ii. 171).

A. quadrilineatus, H. (E. M. M. x. 39, and Scot. Nat. ii. 170).—I have found the galls of this species on several occasions in Essex.

A. glandium, Gir. (E. M. M. xii. 83).

A. terminalis, Fab.—The maker of the common oak-apple is not generically distinct from *Andricus*.

A. trilineatus, H.—I bred this species abundantly from the cupule of *A. gemmæ* galls. An inquiline.

Spathogaster vesicatrix, Schl. (E. M. M. x. 85, and Scot. Nat. ii. 171).—Also occurs at Isleworth (E. A. Ormerod) and Maldon (E. A. Fitch).

S. aprilinus, Gir. (Entom. ix. 76).

TENTHREDINIDÆ.

Nematus cinerea, Retz., Thoms. (E. M. M. x. 278).—"From hairy pea-shaped galls on *Salix cinerea*." P. Cameron (l. c.). It is not stated how the galls of this species differ from those of *N. pedunculi*, H. Are the species synonymous?

Nematus baccarum, Cameron (E. M. M. xii. 189).—"From berry-shaped gall of a grayish green colour, covered closely with fine white hairs, on the leaf of a willow—near *S. aurita*." (l. c.).

N. crassipes, Thoms., var. *Vacciniellus*, Cameron (E. M. M. xii. 190).—"Bred from galls on *Vaccinium Vitis-Idæa*" (l. c.).

N. viminalis, L. (= *intercus*, Pz. = *gallarum*, De Geer, H.).—I have bred *Nemati* which I believe are referable to the above species from the round, smooth, rosy galls which are found on the midrib of the bitter (*Salix mouandra*), and probably other closely-allied willows, kindly sent me in some numbers from Yorkshire by Mr. Inchbald, who writes me—"The gall of the bitter willow, Cameron writes me word, is produced by *Nematus cinerea*, of Retz—a common enough species." There is surely some confusion here; see above for Cameron's description of that gall. *Viminalis* galls are first noticeable in June; the larva is full fed and leaves the gall in August, and I have bred the sawflies in the first fortnight of June (Life-history, see 'Zoologist,' 1863, p. 8473).

N. Vollenhoveni, Cameron (Scot. Nat. ii. 296, Life-history and description).—From galls resembling those of the former species on *Salix purpurea*.

N. crassulus, Dahlb.—"Not uncommon on the banks of the burn at Camachgouran: according to Thomson *N. crassulus* is a gall-maker." P. Cameron (Scot. Nat. ii. 358).*

CHALCIDIDÆ.

Eurytoma hyalipennis, Wlk. (= *afra*, Boh. = ? *graminicola*, Gir.) (Entom. v. 239, 264).—This Chalcid is the producer of galls on *Ammophila arenaria* and *Triticum repens*; at least I have failed to differentiate the species bred from the galls on the sea reed, sent me in numbers by Mr. Inchbald, and those from the twitch, which I find commonly in Essex. The galls, which are generally distributed (Scot. Nat. i. 195), consist of imbricated buds on the principal stalk, and are easily seen and collected in their dry state in the winter: I have bred the flies in June and July.

E. depressa, Wlk. (Entom. v. 239, 451).—From galls on the stems of *Festuca ovina*; flies bred May and June

* Van Vollenhoven has just given us the life-history of this species—which is not a gall-maker—in the 'Tijdschrift' (vol. xix. p. 264).

(Moncreaff). The life-histories of the *Eurytomidæ* are still very obscure.

CECIDOMYIDÆ.

Cecidomyia trifolii, F. Löw. (Scot. Nat. i. 195).—In galled leaflet of *Trifolium repens* and *pratense*. Metamorphosis internal.

C. serotina, Winnertz. (Scot. Nat. ii. 31, 172).—Gall in the terminal bud of *Hypericum pulchrum*.

C. rosæ, Bremi (Scot. Nat. i. 124).—Pseudo-gall on the leaflets of *Rosa canina* and *R. villosa*; generally distributed.

C. Giraudi, Frauenfeld (Scot. Nat. ii. 78).—In galled leaflet of *Astragalus hypoglottis*. Metamorphosis external.

C. Onobrychis, Bremi (Scot. Nat. ii. 78).—Pseudo-gall very like the preceding, but larger on *Vicia cracca*. It also occurs on *Onobrychis sativa*, and probably other allied species.

C. Lathyri, Frauenfeld (Scot. Nat. ii. 78).—In deformed leaflet of *Lathyrus pratensis*, resembling the pseudo-galls of the two previous species. Metamorphosis internal.

C. Pruni, Kalt.—Undescribed. In boat-shaped pouches on the mid- and side-ribs (rarely on the edge of the leaf) of sloe (*Prunus spinosa*) leaves; very common in Essex in June. I have been unsuccessful in breeding the gall-gnats, but a *Callimome* has emerged in some numbers. Metamorphosis external.

Diplosis tremulæ, Winnertz. (Scot. Nat. ii. 253).—In smooth, pea-like, but variable galls on the twigs and petioles of *Populus tremula*. Metamorphosis internal. Kaltenbach gives this species as synonymous with *C. polymorpha*, Bremi.

Asphondylia pimpinellæ, F. Löw. (gall = *C. pericarpiicola*, Bremi = *C. pimpinellæ*, H. Löw.) (Scot. Nat. i. 125).—In galled seeds of *Pimpinella saxifraga*, one larva in a gall; it also occurs on *Daucus carota* and *Pastinaca sativa*. These galls were known to Curtis ('Farm Insects,' p. 416): it was from them that he bred his *Callimome Dauci*. Metamorphosis external.

Asphondylia ulicis, Traill (undescribed) (Scot. Nat. ii. 172).—In galled flower-buds of *Ulex Europæus*.

? *Hormomyia Fischeri*, Frauenfeld (Proc. Ent. Soc. 1871. p. x.; see Entom. v. 298).—The galls on the leaves of *Carex* (*l. c.*) were probably produced by this species.

Urophora solstitialis, L. (Entom. vi. 142).—In galled flower-heads of *Centaurea nigra*, generally distributed.

Trypeta signata, Meig. (Entom. v. 450).—In the enlarged and aborted receptacle of *Inula crithmoides*. The specific determination of this species is very probably erroneous.

? *Trypeta Serpylli*, Kirchner (Scot. Nat. ii. 252).—In galled flower-heads of *Thymus Serpyllum*.

The above list does not include the very numerous mite-galls (*Phytoptus*, Duj.), and the genus *Aulax* is best left as in the 'Annual,' although it needs some revision.

NEW AND RARE BRITISH LEPIDOPTERA OBSERVED DURING THE YEARS 1874, 1875, 1876.

By JOHN T. CARRINGTON.

DIVISION I.—MACRO-LEPIDOPTERA.

(Continued from p. 9.)

Platypteryx sicula.—Five examples are recorded in the 'Entomologist' (vii. 179). These were taken by Messrs. Grigg, Hudd and another, in June, 1874. I hear more have since been taken, but not recorded.

Petasia nubeculosa.—A fine example of this moth was taken at Rannoch last April by Mr. Duncan Robertson, of Camghouran.

Acronycta Alni.—Ten were taken in 1874, three in 1875, and seven in 1876; these were chiefly in the larval stage: six were taken in Yorkshire, four in Gloucestershire, one in Warwickshire, four in Nottinghamshire, one in Derbyshire, two in Hants, and one in Carmarthen (Entom. and E. M. M. for 1874—5—6).

Leucania vitellina.—One taken by Mr. George Tate, New Forest, 1876 (Entom. ix. 183); one recorded by Mr. H. Rogers from Isle of Wight, 1876 (Id. ix. 231).

L. albipuncta.—Two each in 1874, at Folkestone (Entom. vii. 228) and Sheerness (E. M. M. x. 180). In 1875, one each at West Wickham and St. Leonards (Entom. viii. 228). In 1876, four, at Deal, Isle of Wight, and St. Leonard's (Id. ix. 231, 232).

L. extranea = *unipuncta*.—Of this truly American species (the dreaded "army-worm") a single specimen was taken at

Lyndhurst, by Mr. E. C. Parker, in 1874 (Entom. viii. 110).

Tapinostola Bondii.—Mr. W. H. Tugwell re-discovered this species at Lyme Regis in 1874, where it had been taken eleven years previously by Mr. P. C. Wormald (Entom. vii. 205, 292).

Meliana flammea.—Has, I understand, been taken this season (1876) "in the fens" in large numbers (*in litt.*).

Nonogria brevilinea.—"Considerable numbers taken in 1874 and 1875, but scarce in 1876" (*in litt.*).

Xylomiges conspicillaris.—Taken by Mr. Packman, May, 1875, near Dartford. From eggs deposited by this specimen Mr. Farn reared some fine examples (Entom. viii. 135).

Lophygma exigua.—Taken in 1876 by Mr. H. Rogers, Isle of Wight (Entom. ix. 231).

Pachetra leucophæa.—Mr. W. R. Jeffrey records this species from Ashford, 1876 (E. M. M. xiii. 64). Many others have been sent out of Kent during the last three years; but I know of no other authentic capture.

Crymodes exulis.—Mr. N. Cooke, of Liverpool, takes this species sparingly each season in its Inverness-shire locality (*in litt.*). Mr. Fry's collectors also took several this season in the same neighbourhood (*in litt.*).

Hydrilla palustris.—I understand this rare species has again been taken in Norfolk this season (*in litt.*).

Agrotis Helvetina.—Introduced into the British list in error. The examples turn out to be the red variety (*castanea*, Esp., which is really the type) of *Noctua neglecta* (Entom. viii. 135); therefore this species cannot yet be admitted to our fauna.

Noctua flammatra.—Noted from Norwich by Mr. Thornthwaite, and taken by Mr. Rogers in Isle of Wight, 1876 (Entom. ix. 18, 231).

N. sobrina.—Taken in Perthshire by myself in 1874, and again, sparingly, in 1875, when I bred a couple of dozen. Two taken in 1874 by Mr. J. B. Blackburn, at Rannoch (E. M. M. xi. 116). Four each by Messrs. Wheeler and Richardson in 1876 (Id. xiii. 140, *et in litt.*).

Pachnobia hyperborea.—Turned up in 1876. A full account of the British history of this moth will be found in the 'Entomologist' (ix. 241); the specific name is there incorrectly spelled; corrected in same volume, p. 279.

Dasygampa rubiginea.—Of unfrequent occurrence, as usual. Mr. G. F. Mathew took it in 1875 in Devon, at sallows (Entom. viii. 102). Mr. A. H. Jones took it in 1876 at ivy-bloom, at Tintern (E. M. M. xiii. 162).

Xanthia sp.?—The Rev. J. Hellins exhibited a *Noctua* resembling *X. ferruginea*, unknown to M. Guenée and Dr. Staudinger, taken at Queenstown, by Mr. Mathew, flying over bramble flowers, in July and August, 1872 (Trans. Ent. Soc. Proc. ix., 1876).

Dianthæcia irregularis.—Has become scarce again. The Rev. A. H. Wratislaw found few larvæ in 1876 (Entom. ix. 233).

D. albimacula.—Mr. Moncreaff, of Portsmouth, did good service when he found, in 1874, the way to obtain this moth, an interesting account of which he gives (Entom. vii. 130). It has since occurred at Folkestone, as recorded by Mr. Ullyett (E. M. M. xii. 157).

D. Barrettii.—I hear this moth has been again taken at Howth this season by a London collector, four or five specimens being secured. There is some probability that this species will turn out to be a variety of another member of this genus, hitherto unrecorded as British.

Polia xanthomista var. *nigrocincta*.—Larvæ taken each season in the Isle of Man. By Mr. Pankhurst, of Dartford, in 1876, near Douglas, in some numbers (*in litt.*).

Epunda lutulenta var. *Luneburgensis*.—A fine series of this handsome variety was taken by W. Greasley, on behalf of Mr. N. Cooke, in Inverness-shire (E. M. M. xiii. 141). I had the pleasure of seeing several beautiful examples, exceedingly unlike *Lutulenta*. I have seen specimens from Aberdeen and Berwickshire, the latter very bright in colour.

Valeria oleagina.—Incorrectly recorded in 'Entomologist,' viii. 164; corrected, Id. ix. 279.

Hadena peregrina.—Incorrectly recorded in 'Entomologist,' viii. 229; error acknowledged, Id. viii. 284.

Xylina furcifera.—Mr. Llewelyn records this moth from near Neath, a new locality, in 1874 (Entom. vii. 260). Has also been bred in Glamorganshire, by Mr. Evan John; likewise by Rev. Joseph Greene (*in litt.*).

X. lambda.—Mr. Bond has a fine example, taken near Erith, in September, 1875, by Mr. W. Marshall (Entom. ix. 191).

Heliothis scutosa.—Mr. Thornthwaite announces this lost species from Norwich, and invites entomologists to see it and other rare species. Has anyone confirmed their identity? (Entom. ix. 18.)

Erastria venustula.—Thanks to our Horsham friends this species has become less rare than hitherto. In St. Leonard's forest it seems to be quite common in some parts. Like many other rarities, I fear it was often passed as "only a Tortrix!"

Catephia alchymista.—Two specimens are recorded as captured in 1875: one, by Mr. W. Borrer, from Sussex; and a second, by Mr. Harwood, from Colchester (Entom. viii. 164, 185).

Catocala Fraxini.—Was taken in 1874 at Folkestone, by Mr. Oldham; and of course from Canterbury, where six are taken in seven years! (Entom. vii. 228, 289). In 1876, by Mr. Shaw and Mr. A. H. Evans, in Berwickshire (Id. ix. 278; 'Field,' September 16, 1876).

C. electa.—This casual visitor to our shores was taken by Mr. A. Vine, at Brighton, during a strong south-west wind, on the 24th September, 1875 (Entom. viii. 282).

Ophiodes lunaris.—One reported from Brighton in 1874 (Entom. vii. 164); a second was taken in Sussex in 1875, as recorded by Mr. Tugwell (Id. viii. 164).

During the three years, 1874, 1875, 1876, a goodly number of Macro-Lepidopterous larvæ have been described. The following is a list of them, with reference to the published description:—

Danaïs Archippus, Entom. ix. 267.

Lycæna Adonis, E. M. M. xi. 113.

L. argiolus, Id. xiii. 29.

Syrichthus alveolus, Id. xi. 236.

Deilephila Euphorbiæ, Id. xi. 73.

Nola albulalis, Entom. ix. 177.

Lithosia aureola, Id. ix. 47.

L. quadra, E. M. M. x. 217.

Eurymene dolabraria, Entom. ix. 254.

Hemerophila abruptaria, Id. ix. 197.

Cleota glabraria, Id. viii. 193; E. M. M. xii. 84.

Boarmia roboraria, E. M. M. xi. 40.

Hygia auroraria, Entom. ix. 197.

- Asthena Blomeraria*, E. M. M. xi. 87.
Eupisteria heparata, Entom. vii. 175.
Acidalia straminata, E. M. M. xi. 116.
A. emarginata, Entom. viii. 180; E. M. M. xiii. 13.
Larentia cæsiata, E. M. M. xii. 5.
L. ruficinctata, Id. xii. 5.
L. olivata, Id. xi. 86.
Emmelesia decolorata, Entom. viii. 194.
Eupithecia togata, Id. viii. 297.
Coremia quadrifasciaria, Id. viii. 109.
Eubolia lineolata, E. M. M. x. 255.
Notodonta carmelita (vars. of), Entom. vii. 176.
Cymatophora ocularis, E. M. M. xiii. 90.
Nonagria neurica, Id. x. 275.
N. geminipuncta, Id. x. 230.
Hydræcia petasitis, Entom. viii. 195.
Xylophasia lithoxylea, E. M. M. xi. 209.
X. polyodon, Id. xi. 209.
Xylomyges conspicillaris, Id. xii. 83.
Apamea gemina, Id. x. 275.
Miana fasciuncula, Id. xiii. 62.
Caradrina morpheus, Id. x. 254.
Noctua subrosea, Id. xi. 67, 89.
N. rubi, Id. xi. 210.
Dianthæcia albimacula, Id. xi. 17; Entom. vii. 130.
Aplecta occulta, E. M. M. xii. 66.
Xylina rhizolitha, Id. xii. 140.
Heliothis dipsacea, Id. xi. 256.
Anarta melanopa, Id. xiii. 11.
A. cordigera, Id. xiii. 12.
Erastria fuscula, Id. xi. 66.
 Having now completed my summary of *Macro-Lepidoptera*, I hope in next month's issue to finish that of the *Micro-Lepidoptera*.

NOTES ON LYCÆNA ARION.

By GERVASE F. MATHEW, R.N., F.L.S., F.Z.S.

Mr. J. Brown asks (Entom. ix. 204) whether I think it likely that *Lycæna Arion* will be exterminated at Bolthead. In reply, I am sorry to say I have every reason to fear that

this fine species is being rapidly exterminated, and, at the present rate of destruction, will in the course of a few years cease to exist in that particular locality.

Lycana Arion—one of the largest European blues—is a butterfly which, on account of its restricted habits, but few British entomologists have had opportunities of seeing alive, so perhaps some account of my various excursions to Bolt-head in quest of it may not be altogether uninteresting.

My first visit was on July 7th, 1870, and a glorious morning it was, as we left Kingsbridge by steamer at half-past nine for Salcombe. The trip down the estuary occupied about an hour: on the way several likely-looking woods were passed, while on the mud-banks stately herons stood and watched us as we steamed by, or, rising, flew in a flapping, lazy manner a short distance, and again alighted.

On reaching Salcombe I went to the King's Arms Inn, where I procured a bed-room and sitting-room: the floor of the latter showed signs, in the shape of strips of paper, stray pins, &c., of the recent presence of an entomologist. Upon enquiry I learnt that a "fly-catching gentleman" had only vacated the room the previous day; but could not ascertain from the landlady what he had been catching, or whether he had taken any blues: all she knew was that he had been several times out to "the Bolt." By this time it was nearly eleven o'clock, so as soon as I had unpacked my apparatus, and partaken of some slight refreshment, off I started.

The day had now become excessively hot; there was scarcely a breath of air to counterbalance the scorching rays of the sun, and in the evening, when my labours were over, I found the back of my neck was much blistered. The distance from the village to Bolt-head is about two miles, the path in many places steep and rough. *Arion* occurs chiefly beyond the Bolt to the westward, where, between it and the next point, a slope sweeps down from the brow of the high land to the edge of the cliffs below, and here, at times, when the turf is dry and slippery, it is decidedly dangerous to approach too near the cliffs. The upper portion of this slope was thickly overgrown with patches of stunted furze and heather, the latter in profuse bloom; in the open spots wild thyme, *Potentilla*, and bird's-foot trefoil flourished; while, further down, thistles, mullein, and foxglove reared their

flower-spikes above the bracken; here and there, behind the shelter of a dilapidated stone wall, grew dwarfed brambles; and from the turf, just above the cliffs and right down their face to the rocks below, sprung countless tufts of thrift.

Upon reaching this charming spot *Arion* was one of the first butterflies I noticed; there was no mistaking it: its size and brilliant appearance at once attracted my attention as it flew swiftly towards me, and suddenly settled on a sprig of heather quite close to my feet. For a few moments I gazed at it with rapture, for what exquisite delight one experiences in meeting for the first time in its native haunts a species one has never seen before alive, especially such a lovely insect as this; but my desire to possess it speedily overcame all my admiration; so with a sweep of my net I captured, and then boxed it. In the course of the day I secured about three dozen, and might have taken more had I desired to do so, but found many of them worn: these of course were allowed their freedom. As far as I could judge I should have been on the spot at least ten days earlier, although this species probably soon gets injured when flying amongst the furze, for many, otherwise in perfect condition, had small pieces chipped from their wings, showing that they must have flown, or been blown, against the prickly bushes.

The flight of this butterfly has been described by Dr. Bree (Zool. 1852, p. 3350) as resembling that of *Chortobius Pamphilus* and *Satyrus Tithonus*,—both weak flyers; but, as far as my observations go, I cannot corroborate this, for I found it anything but easy to catch, and should call it decidedly swift and strong on the wing.

I generally box all small butterflies alive, finding that after a few moments in the dark they become perfectly quiet; then upon carefully raising the lid they can be seen, and if worn liberated again. It is a pity to pinch these fragile creatures in the net, for, even supposing they are perfect, this process must more or less damage them; and should they be unfit for the cabinet they are thrown away. Thus scores of fertile females, which may not have deposited a tenth portion of their eggs, are destroyed; and by this means a local species becomes rapidly exterminated. Possibly some entomologists will say that butterflies injure themselves when boxed alive; but if large boxes are used this will scarcely

ever happen. Abroad, in the tropics, where I have taken and boxed numbers of small *Lycanida*, I have almost invariably found their delicate caudal appendages as perfect as when first captured. If these small creatures were killed at once, when collecting in a hot climate, they would become so stiff in a couple of hours that it would be next to impossible to set them, and it is well known how difficult they are to relax and set well after they have once become stiff.

Other species were very numerous on this occasion; indeed I scarcely remember having seen so many gathered together in so small an area, nor such a variety: in fact it was a regular butterfly paradise. *Satyrus Semele* was in hundreds, and just fresh from the chrysalis; *Argynnis Aglaia* plentiful and in fine condition, and was—if I may so term it—particularly tame, sitting on thistle-heads. I might have taken a great number had I wanted them. As it was I pinned a few; among them two beautiful varieties: one a remarkably large and very dark female; and the other a male, with the fore wings nearly black. *Argynnis Selene* was scarce, and evidently passing; *Satyrus Janira*, abundant; *S. Tithonus* and *S. Hyperanthus*, just appearing; *Chortobius Pamphilus* and *Hesperia sylvanus*, common; *H. linea*, a few; *Lycæna Alexia*, *L. Agestis*, and *Polyommatus Phlæas*, scarce; *Thecla Rubi*, common; *Lycæna Ægon*, just appearing in fine condition. After staying in this rich collecting ground for a couple of hours, I walked on to Bolttail; and here, sitting on a stone close to the edge of the cliff, were a pair of *Sesia philanthiformis* (in cop.). I tried to box them, but they gave a hop, were blown over the cliff, and I saw them no more. *Pyrausta purpuralis* and *Herbula cespitalis* were common, as was also *Ennychia cingulalis* in certain places, and from among high dry grass I obtained *Cledeobia angustalis*. On my way back to Salcombe I took a number of larvæ of *Dianthæcia capsicola*, *D. cucubali*, and *D. carpophaga*; also *Evpithecia venosata* from seed-pods of *Silene inflata*. Among *Ononis* I found the larvæ, pupæ, and imago of *Pterophorus acanthodactylus* in the greatest profusion. I was too tired to do much in the evening; and the next day, after a brief visit to the same locality, I went on to Dartmouth.

My next visit to Salcombe was on May 22nd, 1875. I left

Dartmouth at eleven o'clock, and drove to a little village called Portlemouth, situated on the east side of the harbour, just opposite Salcombe, from whence I crossed by ferry; I arrived about three p.m. Upon this occasion I put up at the Victoria Inn. After refreshing myself I walked out to Bolthead to endeavour to find the larvæ of *Lycæna Arion*. The afternoon was wild and gloomy, with heavy, dun-coloured clouds passing rapidly overhead, treating me now and again to a brisk shower. On reaching the slopes, where *Arion* was so plentiful in July, 1870, I hardly recognised the spot. The patches of furze and heather, which were then nearly knee-deep, had disappeared; their places were occupied by young, bright green shoots of the former, while the greater part of the latter seemed to have been entirely destroyed: here and there were ominous large black patches, the result of recent fire. I was vexed, and anticipated small success here; nevertheless, in certain places, which had escaped the ravages of fire, I fancied I might make a lucky hit, and stumble across this much-coveted larva. Accordingly down I went on my hands and knees, scrutinizing every plant of wild thyme I came near. The thyme grew best round the patches of furze and heather, so I commenced one side of a patch, and gradually worked my way round to the other. This went on for a long time, during which I must have crawled round some dozens of clumps, with only the uncomfortable result of making my back ache terribly. Consequently I was obliged to give up this plan in despair, and think of some other. Fancying that perhaps the larvæ at this period of their existence might be night-feeders, and secrete themselves during the day at the root of their food-plant, an idea now struck me that if I set to work and dug up a number of the plants bodily, and shook their roots vigorously over a sheet of paper, I might get them. No amount of shaking, however, produced aught but a few common *Noctuæ* larvæ. Next I tried flowers of furze, tender twigs of heather, leaves and roots of *Lotus*, various grasses, &c.; still nothing rewarded my efforts: so, after about four hours of decidedly hard work, I had to give in, and acknowledge myself fairly beaten. I must confess that when I started in the morning I felt very sanguine of success, so my bad fortune was exceedingly disappointing. No doubt it will prove, after all, an easy

larva to find, when its habits are discovered by some more fortunate brother of the net and pin. At one time during the morning my heart nearly jumped into my mouth, for I thought I had found the prize: just under my nose, among the thyme, a dark blue woodlouse-looking larva exhibited itself, and this, on the spur of the moment, I fancied might be that of *Lycæna Arion*; but a closer examination soon proved it to be Coleopterous. These larvæ turned up in some numbers afterwards, and were of all sizes: they were most active when the sun shone on them, but I cannot say what they were, as I did not take the trouble to rear any; possibly they were those of a species of *Chrysomela*. In thrift, small and full-grown larvæ of *Sesia philanthiformis* were plentiful; in two instances I found pupæ, but as by far the greater number of larvæ were small I did not disturb many of the plants. I may observe, however, that I noticed the strong, healthy tufts were attracted by these larvæ just as frequently as the small, starved-looking plants, which they are reported more especially to affect.

I returned to Salcombe about seven, and should have gone out again after dark to have had a search for larvæ by lamp-light, but the wind blew so heavily and in such strong gusts no lantern would have stood it.

The next morning was much brighter; so after breakfast I walked again to Bolthead, and had another three hours' hard work in a different locality, but unfortunately with the same result. I then went back to Salcombe, when crossing the ferry I walked back to Dartmouth, reaching the ship about eleven o'clock, thoroughly tired and done up, and pretty well disgusted at my want of success.

(To be continued.)

EDUCATIONAL COLLECTIONS.

By SAMUEL J. CAPPER.

Dr. Buchanan White's interesting paper on *Hemiptera* in the January number of the 'Entomologist,' in which he draws attention to the comparative neglect bestowed by entomologists upon the study of this order of insects, prompts me to pen the following:—

How seldom do we find in the case of death that the children of any well-known, hard-working entomologist continue to add to their late parent's collection. In nearly every instance such collection, which has probably been the result of a long life's work, is handed over to a museum, sold in the market, or allowed to fall into decay. Now, how is this? May not one reason be, the very completeness of the parent's collection has a discouraging influence upon the children, seeing the small chance that remains of their making any important additions; consequently they cannot have the same interest in it that they would have in a collection formed entirely by themselves.

Some of the happiest hours of my life, even from earliest childhood to the present time, have been experienced in studying Natural History; more particularly in collecting, observing, and arranging *Lepidoptera*. I am most desirous that my children should participate in such pleasure; so it occurred to me some years ago that, by making a typical collection of insects in all orders, I might induce them to select some order in which they took a sufficient interest to make them study it, and collect specimens for themselves. I call these types my "Educational Collection." I have found its arrangement most useful to myself, by giving me a general knowledge of all the orders. It also will, I trust, answer the purpose for which it was undertaken. Indeed, I would recommend such a collection as worthy the attention of all entomologists, not only as a source of interest and amusement to themselves, but they will find their friends take more pleasure in the exhibition of such a collection, than a larger one simply of *Lepidoptera* will afford. The whole of my typical collection occupies five large drawers, eighteen inches by twenty-two inches. It is arranged in accordance with Mr. E. F. Staveley's interesting work on British Insects. The first drawer is devoted to *Coleoptera*, and all the leading orders are represented: the *Adephaga*, *Hydradephaga*, *Necrophaga*, *Brachelytra*, *Clavicornes*, &c. The object is not to exhibit rare individuals, but interesting, typical, and, as far as possible, well-known species, introducing these in their proper places: for example, the tiger-beetle, burying-beetle, devil's coach-horse, skipjacks, pill-beetle, cockchaffer, and musk-beetle; not forgetting the glow-worm, death-

watch, ladybird, &c. The second drawer contains the *Orthoptera*, with the cockroach, mole-cricket, &c.; the *Neuroptera*, *Trichoptera*, and *Heteroptera*. The *Lepidoptera* are well represented in two drawers: four wide columns suffice for the butterflies, which are here arranged according to the late Mr. Newman's classification; the hawk-moths are well represented in one column; the *Geometers*, two columns; and so on. To this collection I have added, whenever procurable, the preserved eggs, larvæ and pupæ of the species represented; thus tracing, as far as possible, the life-history of each. The fifth drawer contains the *Hymenoptera*, *Hymenoptera*, and *Diptera*.

Let me suggest to others the pleasure and convenience such a collection affords to its owner, in addition to the other reasons I have given for its formation.

Huyton Park, Liverpool.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

TURKEY OAK-GALLS.—During the last summer, having permission kindly given me to search for galls on the trees in the Royal Gardens at Kew, I had opportunity for frequent examination of the Turkey oaks (*Quercus cerris*), which I believe have hitherto been considered as exempt from gall-growths in England, and was fortunate enough to find, though only by careful and repeated search, a very few specimens of a minute gall on the twigs. The first that I noticed were during April, on the lower twigs of a large tree labelled "*Q. cerris*, var. *Lucombeana*," but were apparently growths of the previous season, with the colour of the downy outside so much blackened by age that, excepting size and shape, the thin cell wall, and the decided downiness of the exterior, it was almost impossible to make out any determinate characteristic. Somewhat later in the year I found two more (like the others growing close together, and almost precisely similar to them in shape and size), of which the accompanying figure is a much-magnified representation, in the condition in which they were first observed. These were on a large tree of considerable age, labelled "*Q. cerris*," and placed on a twig at the base of a still smaller one, and (like the others) amongst a few linear stipules. These galls were somewhat more than the sixteenth of an inch in length, and

somewhat less than half that measure in breadth, of an elongated, obtusely oval shape, the lower extremity being completely rounded, and the sides parallel for a short distance, terminating at the upper end in an exceedingly blunt point; the exterior of the gall of an orange-yellow, and forming a thin wall to the central chamber. In most points the galls coincide with the description of the *Spathegaster Taschenbergi*, of Schlechtendal,* and though not quite as large, might be conveyed by the figure 96, plate 7, of the 'Mitteleuropaischen Eichengallen,' of Dr. Mayr, but in the six specimens which I found the amount of woolliness was so much less (if indeed it could be said to exist at all) on the fresh and brightly coloured galls of the true *Q. cerris*, that I feel a doubt of their being of the same species. Some degree of interest, however, attaches to the presence of galls (even undetermined) on the Turkey oak, and as the locality protects both the trees and their almost microscopic tenants from molestation, I hope by careful watching in the coming season to be fortunate enough to secure fresh specimens, in which the insects may still be enclosed, for correct determination.—E. A. ORMERON.



QUERCUS CERRIS.

[The oaks of Europe are divided botanically into two groups:—(1) represented by *Quercus pedunculata*, Ehrh., *Q. sessiliflora*, Sm., and *Q. pubescens*, Willd., with their varieties; (2) represented by *Q. cerris* and its varieties, and it is an undoubted fact that we never find the same species of *Cynipidæ* occasioning galls indiscriminately on the two groups; each group has its own restrictive gall-makers. This will no doubt be explicable when the physiology of the gall is known, but in the present state of our knowledge it is hard to say whether the varied influence is insectile or botanical; this exclusiveness is not limited to oak-frequenting species, but pervades in a greater or less degree the whole range of gall life. Of the ninety-six species of European oak-galls described in Dr. Mayr's work, two are synonymic, three

* Stett. Ent. Zeit. xxxi. 391.

species unknown to him and therefore doubtful, whilst seventy are limited to the first group, and twenty-one to the second: from this it will appear that the above communication is especially interesting, as being the first authentic record of a *Cerris* gall occurring in Britain. Other Continental species will doubtless follow the introduction of their special pabulum, which is now so widely distributed in these islands, and when once established their march may be as rapid as has been that of *Kollari*, a most noteworthy occurrence, considering the lethargic habits of the insect, which, though so common, has been noticed on the wing but on one or two occasions; although I have taken and bred some hundreds of specimens, desirous of the male, I don't think I ever saw one fly. I hope further research will complete the history of this species, which, from the nature of the gall, I opine is not included by Mayr, and will therefore prove new.—E. A. F.]

INHABITANTS OF KOLLARI GALL.—Last winter I collected a double gall of this species, and then, in order to examine the enclosed inhabitant of the larva-cell, broke one side of the gall open, but finding the parenchyma tenanted, I isolated it, and in April, May, and June last there emerged twenty-three *Synergus Reinhardi*, Mayr, six *Callimome regius*, Nees, and four *Eurytoma squamea*? Wlk.—all these from three-fourths of a double gall.—EDWARD A. FITCH; Maldon.

PHYLLOXEROUS RAVAGES IN THE COGNAC DISTRICT.—Entomological subjects are thrusting themselves upon us: although the potato-beetle scare is subsiding, we have another, possibly of greater import, nearer home. Brandy drinkers, beware! The price of your favoured liquor has advanced (wholesale) some 50 per cent. within the last six months, and is still rising. This is all due to the scarcity caused by an almost microscopic insect, the now well-known *Phylloxera vastatrix*. Its ravages are but too patent, and by no means have they been abated, in spite of the immense amount of entomological research, both European and transatlantic, which has been expended on the subject. A thoroughly practicable remedy would be cheap at the government prize of £12,000. When will such be forthcoming? However, the object of this note is not to refer to the entomological, but to the commercial, aspect of the question; for when large vinicultural districts, like many of the departments in the South and West of France, come to produce from 75 to 90

per cent. short of an average crop, the matter is serious indeed, both for the welfare of the interested inhabitants of the country itself, and of our own wine imports, should these ravages extend and be continued. We can at present have but little hope of extirpation or abatement, and it is possible that Cognac will be relegated from the spirituous liquors to the medicinal lists; how our wine list will fare deponent sayeth not. The year 1876 will long be remembered as a most disastrous one in the annals of brandy production, the present vintage being of very small proportions. The following is taken from a trade circular, but is believed to represent by no means pessimist views:—"The *Phylloxera* was first noticed in 1865 among the vineyards of the South of France, where it has been ever since committing most appalling ravages. Thus, the Department du Gard, which used to produce 126,000,000 gallons of wine, now scarcely yields 40,000,000; the Commune of Castries, in the Departement de l'Hérault, produced, before the appearance of the *Phylloxera*, 3,000,000 gallons; whereas one year after it did not give more than a quarter of a million; three years later the vineyards had been entirely destroyed. Having travelled in a northerly and north-westerly direction, the 'plague' appeared three years ago amongst the vineyards of the Charentes. At first its ravages were confined to a few parishes; last year it showed itself in more than two hundred, but only in small patches here and there. These patches, however, were so many 'beds of infection,' from which the pest spread to all the vineyards around; and this year entire districts have been laid waste, and innumerable fresh 'beds' have appeared on all sides. It may not be out of place here to quote the words of a speech, made before the Agricultural Committee of Saintes in September last, by M. Dufaure, then Prime Minister of France, who is himself a large vineyard proprietor in the Charentes:—"The *Phylloxera* makes every day fresh ravages; and I ask you, gentlemen, supposing that nothing be found to stop this plague, would you recognise our country, if you no longer saw those magnificent vineyards which cover its soil and make its wealth? Everything has been done: inquirers have sought the *Phylloxera* in the very bowels of the earth in order to destroy it; but until now all the efforts of science have been powerless. The Government has given

this question the greatest attention. The National Assembly, last year, voted a very large prize (£12,000) to reward the discoverer of a means to destroy this vile insect. The new Chamber has equally entered the list. Committees of Deputés and Sénateurs are working actively; and even yesterday I received from my colleague and friend, the Minister of Agriculture and Commerce,—who himself is a very able agriculturist, and collects all information concerning agriculture,—a note, which I was awaiting with impatience, in the expectation to find in it some ground of hope to transmit to you, but from which it appears that until now no efficacious remedy has been found in which we could place confidence.' The quantity of wine produced in most localities varies from 10 to 25 per cent. of a crop; and it is only in a few favoured spots that the yield is from 30 to 50 per cent. of an average."

—E. A. FITCH.

ARGYNNIS LATHONIA (VARIETY).—Last summer, while in Norway, I caught a very remarkable variety of *Argynnis Lathonia*: the upper side of both wings is of a sooty black colour, with hardly any markings, excepting indistinct ones on the costal margin. The under side is equally strange; the silver spots have run into one another and form streaks.—R. W. BOWYER; Haileybury College, Hertford.

DESCRIPTION OF THE LARVA OF LITHOSIA MOLYBDEOLA.—On the 28th of November, 1876, I received from Mr. R. Kay (2, Spring Street, Bury) two larvæ of *L. molybdeola*, the larger of which was about five lines in length, and the smaller about four. Head slightly smaller than the second segment, and when the larva is at rest drawn within it, intensely black, highly polished, notched, and rounded on the crown. The body of the larva is dark umber-brown, slightly attenuated towards each extremity, considerably so anteriorly when in motion. Medio-dorsal line velvety black, narrow; subdorsal line also velvety black; seated on this line, on the fifth and each succeeding segment, is an oblong spot of a dull orange colour, becoming almost white anteriorly, this whiteness appearing most conspicuously on the fourth, fifth, sixth, and seventh spots; detached from these spots, and situated on the segment immediately preceding, there is another much smaller white spot, which occurs also on the third segment, although there is no orange spot on the succeeding segment; these small white spots are only visible when the larva is in

motion, being situated deeply in the incisions of the segments. On each segment, and immediately behind each orange spot, where those spots are present, is a wart, from which springs an abundant tuft of short brown hairs; a similar wart is also situated below each spot, and a third below the second; this third wart is placed immediately below the spiracular line, which partakes very much of the dull orange colour of the dorsal spots, and is edged on either side by a narrow line of velvety black; from all the warts there spring similar tufts of short brown hairs. The ventral space is grayish; claspers light brown, furnished with short hairs at their juncture with the body. The eggs from which these larvæ were hatched, Mr. Kay tells us, "were deposited July 24; larvæ hatched in nine days, will feed on lichens, chickweed, lettuce, dandelion, and sallow, and although kept in a warm place with the intention of forcing them, they grew very slowly; apparently they would hybernate in their natural state." As near as Mr. Kay "could tell, the larvæ moulted some ten or twelve times. One of this batch began to spin a cocoon on November 16th, by drawing together two leaves of sallow."—[REV.] P. H. JENNINGS.

EUTHEMONIA RUSSULA.—Whilst collecting in North Kent, on the 28th of June last, I met with *E. russula* in great numbers. I found it required much disturbance of the long grass to get the females to fly, and even then their flight was a mere hover and down again into the grass: the males flew wildly at the slightest disturbance. Amongst my captures were two females, one of which laid six eggs in my collecting box; these I saved. Six days after, upon examining the box I had placed them in, I found six larvæ; these I at once supplied with a few small pieces of lettuce, upon which they fed. They continued to feed well until the end of July: then four of them seemed inclined to hybernate, the other two continuing to eat the lettuce-leaves most ravenously. On the 10th of August one spun up, and the imago, a male, appeared on the 23rd of the same month; the other spun up on the 20th of September, and the imago, also a male, appeared on the 8th of October. The other four larvæ are hybernating: I now supply them with French lettuce leaves twice a week, and they occasionally eat it on mild days.—E. R. SHEPPARD; 13, Limes Villas, High Road, Lewisham.

MACARIA ALTERNATA.—In your "New and Rare Lepidoptera," &c., in the January number of the 'Entomologist,' I note that you chronicle only three localities for *M. alternata* in the past three years. It is perhaps owing to an unintentional reticence on the part of Surrey entomologists that Coombe Wood—one of the favourite habitats of this species—is not included in your list. I may mention, however, that during the last three years, two other collectors and myself have taken between four and five dozen of this species.—R. S. STANDEN; Holmwood Lodge, Surbiton.

VENUSIA CAMBRICARIA, HERMAPHRODITE.—On the 21st of last July I took a hermaphrodite specimen of *V. Cambricaria*. It is a most singular-looking moth.—ARTHUR DONCASTER; Broom Hall Road, Sheffield, November 20, 1876.

ANTICLEA SINUATA IN HERTFORDSHIRE.—On July 27th, 1876, I took a very good specimen of *Anticlea sinuata* in a chalky lane near the village of Farnham, about two miles from Bishops Stortford.—A. J. SPILLER; Nov. 24, 1876.

LARVÆ OF TRIPHÆNA SUBSEQUA.—January and February is the season to sweep the larvæ of *Tryphæna subsequa* if the weather be mild and damp, as it is at present. It is to be found feeding on *Dactylis glomerata*, and sometimes on *Triticum repens*, but the former seems to be its favourite food. Later in the season it seems to be more retiring in its habits, for I have been unable to find it after February, when it may take to other food; but I have reared it entirely on grass. One specimen, found in April, 1874, feeding at night, was still on grass in my garden, so that I am disposed to think it entirely a grass-feeder in the wild state, though some friends have fed it on chickweed and other small herbs.—[Rev.] HENRY WILLIAMS; Croxton.

HELIOTHIS ARMIGERA NEAR BRISTOL.—I beg to inform you of the capture, by myself, of a male specimen of *H. armigera*, at ivy bloom, here, on October 20th. The insect had evidently just emerged, as it is not in the least worn or damaged.—J. PRESTON; Fishponds, near Bristol.

AGROTERA NEMORALIS DOUBLE-BROODED.—As this beautiful little species has hitherto been considered single-brooded, I was much surprised to find that my pupæ, which I had reared from eggs deposited in the first week in June of this year, all produced imagoes during the last week of July; some of them only remaining twelve days in pupa. July, 1876, was

extremely hot, and that possibly hurried them through quickly, so that the first week in August would be about the time to look for a second brood at large. This second, or summer brood, like many others that pass rapidly through their metamorphosis, differs considerably from the specimens taken in May, the tone of colouring being decidedly less brilliant. I am disposed to think that most insects which feed up unusually fast, produce, as a rule, duller coloured imagos than those of the same brood which feed more leisurely. Thus *Acidalia emutaria*, that I have reared in a few weeks from the egg state to the imago, have been totally devoid of the beautiful pink tinge that my hybernated larvæ have produced: I am not prepared to say that this is an invariable rule, but my experience points to that conclusion.—W. H. TUGWELL; 3, Lewisham Road, Greenwich.

FOOD OF TORTRIX VIBURNANA.—I see Mr. Stainton, in his 'Manual,' gives *Myrica Gale* and *Vaccinium* as the food-plants of *T. viburnana*. As it is frequently found where neither of these plants grow, I may say that I have, during the last sixteen years, been in the habit of finding large numbers of the larvæ of this moth upon dwarf willow (*Salix repens*) in June, while "sweeping" for the larvæ of *Epione vespertaria*. It is a particularly lively larva. Head is yellowish brown; ground colour of the body dark green, dotted with numerous black spots. In going to pupa it spins a cocoon between united leaves of its food-plant.—WILLIAM PREST; York, December 1876.

[Respecting the food-plants of this species, Kaltenbach, in his 'Pflanzen-feinde,' gives the following on varied authorities:—"Between the leaves of *Viburnum Lantana* and on *Coronilla*, on the authority of the Wiener Verzeichniss; according to Madam Lienig, on *Pinus sylvestris*, either in the young shoots drawn together with threads or between the needles which have dropped on the branches, also on *Juniperus*, *Ledum palustre* and *Pinus abies*; according to Hiememann, on *Vaccinium uliginosum* and *Andromeda polifolia*; according to Hartmann, on *Salix repens*. May and June is given as the time of occurrence in all cases.—E. A. F.]

TINEINA REARED IN 1876.—The following species of *Tineina* were reared during this season:—*Butalis grandipennella*.—

I reared a fine series of this species from larvæ collected from furze-bushes, at Wanstead, the middle of June: the larvæ fed under webs, which are generally placed on stems of some years' growth, and are consequently difficult to collect; I used a strong pair of cutting-pliers for cutting out those portions of the plant containing the webs, which should be disturbed as little as possible. *Anarsia spartiella*.—Bred freely from larvæ collected on the furze-bushes with the above mentioned. *Depressaria costosella*.—I reared this species in profusion, in July, from larvæ found on the three following plants: *Ulex europæus*, *Spartium scoparium*, and *Genista anglica*; those reared from the latter plant are the most beautiful, many being a rich pale brown. *Coleophora genisteae*.—I found the larvæ of this somewhat local species tolerably abundant last June, on *Genista anglica*, in Epping Forest, and about fifty moths emerged during July and August. *C. virgaureella* were reared in profusion in August, 1876, from larvæ collected from the seed-heads of golden-rod (*Solidago virgaurea*) in November, 1875: they are easy to rear, if kept exposed to the influences of the weather.—W. MACHIN; 22, Argyle Road, Carlton Square, E.

DOUBLE-BROODED INSECTS.—On August 7, 1868 (an early year), I first took an autumnal specimen of *Lobophora viretata*. On mentioning the circumstance to Mr. Bond, and other practical entomologists, I found they were already aware of the fact of its occurring twice annually. In the same way *Fidonia conspicua*, *Hadena atriplicis*, and many other species, are double-brooded: but we must follow up Nature in the fields, and in the woods, to ascertain what species are naturally so, and not trust to books. I do not fancy *Papilio Machaon* is strictly double-brooded, like *Agrophila sulphuralis*, which keeps coming out all the summer through. In the autumn of 1871, I collected about six dozen larvæ of *P. Machaon*, all just full fed; the pupæ were all kept during the winter and spring in precisely the same condition; the first butterfly emerged on the 18th of May, 1872, and the last on August 10th, the greater number during the third week in June.—BATTERSHELL GILL; 9, Cambridge Terrace, Regent's Park, N.W.

ABUNDANCE OF LARVÆ.—I have noticed this autumn an unusual abundance of the larvæ of *Pieris Brassicæ*. The

cabbages in this neighbourhood have been literally reduced to skeletons by these pests; the chrysalids are to be seen by scores on every wall. Last August the geraniums and other plants in my garden were swarming with larvæ of *Noctua* of various species; the leaves and stalks, especially of the geraniums, were eaten away considerably. I gathered scores of larvæ, which—there being such an assortment—I made no attempt at identifying, but await their arrival at the perfect state.—R. LADDIMAN; Norwich, November, 1876.

[We have received several other complaints of a like character. Mr. Fitch can fully corroborate them, as he had last autumn a field of Swedish turnips—six acres in extent—completely defoliated and destroyed by Lepidopterous larvæ. Many farmers in his county, Essex, have suffered to a greater extent. Vegetables in town gardens have also been in many instances destroyed.—ED.]

A SCOTCH NATURALIST.—We note with pleasure that Her Majesty the Queen has conferred a pension of £50 a year upon Mr. Thomas Edward, of Banff, the subject of the new, but already celebrated, book by Mr. Smiles, entitled the 'Life of a Scotch Naturalist.' Although an entomologist, Mr. Edward is better known to the readers of the 'Zoologist,' than to those of the 'Entomologist.' In the pages of the former are many notes from his pen, of that original and graphic character which we should like to see more frequently in our magazine. In announcing the pension, Lord Beaconsfield says:—"The Queen has been much interested in reading your biography, by Mr. Smiles, and is touched by your successful pursuit of natural science under all the cares and troubles of daily toil." We recommend all our readers, who have not already read this book, to do so. We have rarely found one more amusing or interesting.—ED.

ENTOMOLOGICAL SOCIETY OF LONDON.

ANNUAL MEETING, JANUARY 17, 1877.

Sir Sidney Smith Saunders, C.M.G., Vice-President, in the chair.

An abstract of the Treasurer's accounts for 1876 was read, showing a balance of £6 8s. in favour of the Society.

The Secretary then read the Report of the Council for 1876, in which it was stated that a donation of £150 had been received from Mr. Dunning.

The following gentlemen were elected Members of Council for 1877:—Sir Sidney Smith Saunders, Professor Westwood, Rev. A. E. Eaton, Rev. T. A. Marshall; and Messrs. H. W. Bates, G. C. Champion, J. W. Douglas, J. W. Dunning, F. Grut, R. Meldola, E. Saunders, H. T. Stainton, and J. Jenner Weir.

The following Officers were subsequently elected for the year 1877:—President, Prof. Westwood, M.A., F.L.S., &c.; Treasurer, J. Jenner Weir, Esq.; Honorary Secretaries, Messrs. F. Grut and R. Meldola; Honorary Librarian, Rev. T. A. Marshall.

The President (Professor Westwood) having been unfortunately prevented from attending by an accident, the reading of his Address on the progress of Entomology for the past year was unavoidably postponed until the next Meeting, on the 7th of February.

DEATH OF MR. CHARLES HEALY.—We regret to have to record the decease of this painstaking entomologist. As with many others so with Mr. Healy: his first love was the Macro-Lepidoptera; but it was not long before the Micros received attention, and their various modes of life interested him to such a degree that the larger species became neglected; whilst among the Tortrices and Tineæ various sawflies were naturally brought to his notice, notably the leaf-mining and stem-feeding species. This led to more extended observations; and towards a knowledge of the life-histories of these three families Mr. Healy did much good work: some species were worked out in marvellous detail. These observations were contributed to the pages of the 'Intelligencer' (vol. ii. 1857, *et seq.*) and the 'Entomologist' (vols. ii. to v.). For the last five years he seems either to have ceased to work or ceased to record,—probably only the latter,—as he was always an active member of the Haggerston Entomological Society, almost from its foundation. His occupation through life was that of a solicitor's clerk. Mr. Healy died on the 27th December, 1876, when in the fiftieth year of his age, and was interred at Ilford Cemetery. He leaves behind him a small, but select, collection of Tortrices, Tineæ, and Tenthredinidæ, the greater part of which were bred by himself, being, as he was, far more of an observer than a collector.—E. A. F.

THE ENTOMOLOGIST.

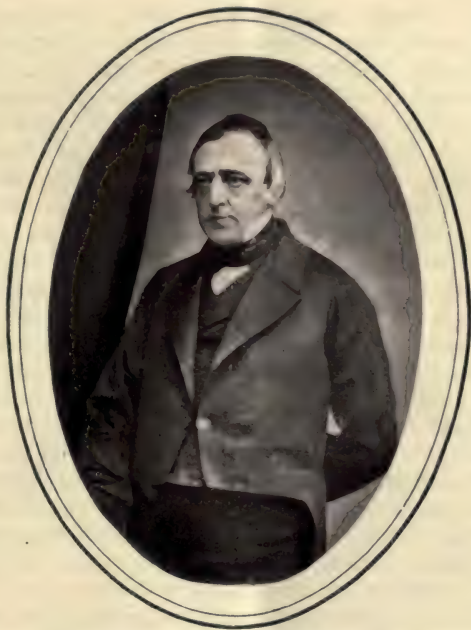
VOL. X.]

MARCH, 1877.

[No. 166.]

BIOGRAPHICAL NOTICES.

No. I.



HENRY DOUBLEDAY.

By J. W. DUNNING, M.A., F.L.S., &c.

IN the early part of this century there dwelt in a plain brick tenement, on the north-west side of Epping Street, a worthy member of the Society of Friends, named Benjamin Doubleday. The house had formerly been an inn, the "Black

Boy," but had been acquired by the Doubledays about 1770, and converted into a shop for the sale of hardware, grocery, and provisions generally, such as is commonly found in small country towns. The family of Benjamin Doubleday and his wife consisted only of two sons, the elder of whom, the subject of this memoir, was born in 1809. The sons were brought up to their father's business; and there are those still living who can remember both brothers busy in the shop with their aprons on.

Both sons from an early age exhibited a taste for Natural History, which, so far as can be ascertained, was not inherited from their parents, but was probably developed by the surroundings amongst which their boyhood was spent: for the grand old forest then encircled the little town, and spread, almost unbroken, over nine thousand acres,—a wild expanse, rich with oak and beech and hornbeam, intermingled with ancient hollies and knotted hawthorns, with a tangled undergrowth of roses and brambles in profusion, and lower still, a carpet of flowering plants and ferns, of mosses and many-coloured fungi. Happily the glories of High Beech and other lovely fragments of the old forest still remain to suggest what Epping and Hainault must once have been; and it is scarcely matter for surprise that amidst such surroundings the brothers should have betrayed a liking for birds and insects, and have become careful observers of their habits.

Of the younger brother, suffice it to say that he did not long remain at Epping; but after lengthened travel in the New World, Edward Doubleday became one of the scientific staff at the British Museum, the associate of Hewitson and Westwood in the production of 'The Genera of Diurnal Lepidoptera;' and whilst filling the office of Secretary to the Entomological Society of London his career was cut short before he had completed his fortieth year.

But it is with Henry Doubleday that we are now concerned. It was his fate to live all his life in the primitive little Essex town, to live and die in the very house in which he was born; and his existence was as uneventful as can well fall to mortal lot. A solitary visit to Paris in 1843 was the only occasion on which he ever left England; and though during his father's lifetime he made frequent collecting expeditions, chiefly, however, confined to the eastern counties, these were

in later years almost wholly abandoned; and when in 1873 he spent a couple of days with Mr. Hewitson, at Oatlands, it was the first time he had slept in a friend's house for more than seven and twenty years. Upon the death of his father, in 1848, the entire management of the business at Epping devolved upon Henry Doubleday; in addition to which he was the local agent for the Sun Fire Office, and the Treasurer both of the local turnpike trust and of the Poor Law Union. Henceforth his various duties kept him a close prisoner at home. His collecting excursions gradually ceased, or were performed vicariously by Mr. James English, who, from 1838, had been his constant companion on such occasions, and who continued to collect for him to the last.

It is well-nigh thirty years since Henry Doubleday, by the intervention of the Editor of the 'Zoologist,' was first brought into communication with the present writer, then a lad at school in Yorkshire, who had taken a fancy to *Lepidoptera*, and collected perhaps a couple of hundred of our commoner species. The delight of the schoolboy may be imagined on receiving shortly afterwards a box from Epping containing several score species, chiefly southern, some of considerable rarity, whilst the specimens were mostly bred, and all set to perfection. In this respect my experience was only that of every youngster who came in contact with him. I believe nothing in the world gave him such pleasure as to make up a box of insects which he thought would be useful to any of his correspondents. His liberality was unbounded; nor was it limited to the gift of that for which he himself had no use; but, occupied as he was, he would devote hours of his time to naming obscure-looking insects for anyone who chose to trouble him, and would take endless trouble to enable him to answer conscientiously the multitudinous enquiries that were addressed to him.

I am not aware that Doubleday ever interested himself in any other order of insects than *Lepidoptera*; though a short note by him on *Sympetrum*, a genus of dragonflies, will be found in the 'Entomologist' (1841); and in *Lepidoptera* he had no great knowledge of exotic species, whilst his acquaintance with the European forms was made for the purpose of studying and understanding the British species. In short, it was as a British Lepidopterist that he was

pre-eminent. His British collection was unsurpassed in richness and extent, and was always open to the inspection of any entomologist who would run down to see it. Its fame spread far and wide, and attracted many a visitor to Epping; and these visits of brother entomologists were for years the only breaks in the seclusion of his life.

But Doubleday was not an entomologist only: he was eminent also as an ornithologist and oologist; and many of his observations on birds and their nidification are incorporated in the works of Yarrell, Newman, and others; moreover, he was a capital shot, and could thus not only obtain his own specimens, but could afterwards stuff them and set them up to perfection. During the latter part of his life, however, his attention was less given to birds and eggs. His garden and his greenhouse were his never-failing delight. Always an active man, and fond of out-door exercise, he would rise in summer with the sun, and might be found in his garden at the back of the house looking after his flowers and fruit, or in his paddock beyond the garden noting the birds as they flew over. He also took an interest in photography, and was a considerable reader of contemporary literature.

His life was simplicity itself. Gentle and quiet in his manner, he moved about the house with velvet-tread, as noiselessly as one of his own pet cats. Shy and retiring, even to a fault, he seemed almost to dread to meet a stranger; and doubtless many, on first meeting him, must have felt somewhat disappointed with his constrained reserve. But when once the first interview was over and the ice was broken, the goodness of his heart shone forth; acquaintance warmed into friendship, and no demand upon his friendship was too great for him to comply with.

His correspondence both with English and European entomologists was extensive; and his letters to his more familiar friends were pleasing from their simple-mindedness. He was a most active penman, and habitually regular in replying to all communications. Occurrences of birds and insects, and details of their habits; the flowering of his plants, or the condition of his strawberry-beds; the death from old age of his gardener, or of a favourite cat; peculiarities of the weather; lamentations over his own health, and enquiries after his friends'; at one time gently chiding the

silly contentions of rival editors; at another, exposing the tricks of those who would palm off, as British, continental specimens which had been relaxed and re-set; the whole mixed up with expressions of gratitude for any little service or kindness rendered to him;—these, and such topics as these, formed the staple of his letters, which, if not of a kind well-fitted for publication, were at any rate the effusions of an honest mind and an affectionate nature.

Henry Doubleday was an original member (1833) and a life-long member of the Entomological Society of London; and a few notes by him may be found scattered amongst the Proceedings of the Society; but his published writings are few in number, and small in extent. His earliest paper was on the habits of the hawfinch, and was printed in 'Jardine's Magazine of Zoology,' in 1837. His first entomological publication appeared in the 'Entomologist,' in 1841, on the occurrence of *Noctuæ* at sallow-blossoms. In 1842, in the 'Entomologist,' and in 1843, in the 'Zoologist,' he made known the now accustomed plan of "sugaring" for moths. And occasionally throughout his life he contributed notes on birds, bats, and other Natural-History subjects,—chiefly on *Lepidoptera*, and descriptions of new British species,—to the various magazines of the day. But his only work of magnitude was the 'Synonymic List of British Lepidoptera.' Finding on his visit to Paris that the English nomenclature of the order, as then established by James Francis Stephens, was wholly different from that in vogue on the Continent, he set himself to work to compare the two, with a view to ultimate uniformity; and upon this thankless task he spent an amount of study, labour, and time, which can scarcely be credited by those whose recollection does not go back to the days when no 'Doubleday's List' existed. The first catalogue appeared at intervals between 1847 and 1850, but did not include the *Tineina*. The second edition appeared in 1859, and included the whole of the *Micro*-, as well as the *Megalo-Lepidoptera*, the arrangement and nomenclature being chiefly after Guenée. In this list nearly one thousand nine hundred species are enumerated; a first supplement in 1865, and a second supplement in 1873, increased the number to nearly two thousand one hundred species.

It must have been a monotonous and wearisome task,

entailing a vast amount of patient labour and study. Indeed, it is those only who can remember the state of our English collections of thirty years ago who can really appreciate Doubleday's work, and the good that has been effected by the compilation of his List, in which he not only reduced many so-called species to their proper rank of mere synonyms or varieties, but reformed the whole nomenclature of the order, and brought it into unison with that adopted on the Continent.

But the most noticeable thing in Henry Doubleday was his constant and careful observation of the habits and Natural History of species. Probably no man ever reared so many British *Lepidoptera*, and certainly no man ever acquired the same amount of knowledge of the economy and habits of so many species as he. If he could have been induced to take his own List in his hand, and write down all he knew of the different species, his observations would have made such a book as has not yet been written. But though ever ready to communicate information to others, for publication or otherwise, he was never anxious himself to rush into print; and it was only in reply to enquiries that his experience could be drawn out. His diary contained occasional short entries of the occurrence of birds, insects, or plants, with the extremes of the thermometer in early spring; but the bulk of his observations were never recorded, and most of his knowledge has perished with him.

In 1866 he sustained what to him was a heavy pecuniary loss; and, as he afterwards confessed, he lacked the courage to look his difficulties boldly in the face, but lived on as before, buoyed up by hope that all would come right in the end. But in 1870 a crisis came. "Everything has gone against me the last four years (he writes), and I see no prospect of brighter times. I must part with everything, and I am quite broken-hearted." The sale of everything he possessed would not produce sufficient to pay his debts. Ruin stared him in the face: he became melancholy, bewildered, at times delirious; and his mind having for a time lost its balance he was placed in a Retreat, near York, where he passed three months in the beginning of 1871, until under gentle medical care his mental equilibrium was restored.

Very touching are his letters written from the Retreat:—"I do feel so dull and lonely here, and there is no bright prospect

when I leave this place." "What will become of me I cannot tell: I shall have no home to set my foot in." "It is very sad indeed to think that the dear old house, in which I was born and have resided ever since, will soon be in other hands, as well as all my collections." "My thoughts dwell constantly on that dear home where I have had a large share of happiness, and where in fact was everything that I could want." "I cannot help thinking of the loss of everything that was dear to me in the world; and it really seems as though my attachment to my dear home, and my interest in the collection of *Lepidoptera*, was stronger than ever. I have spent a great deal of time in making it what it is, and I hoped that it would be mine as long as I lived, and that I should be able to render it more and more useful to my friends." "How I wish I could see the least prospect of my being able to pass the few short years that, under any circumstances, can be mine in the home that is so dear to me." "How I wish it was possible for me—as a tenant, or in any other way—to remain in my beloved home, which seems dearer and dearer to me every day; the garden was a real source of enjoyment to me: and I am so devotedly attached to the place of my birth, and to my kind friend Ann Main, that I think a separation from them will so affect my spirits that I shall not long survive." "I do not get a great deal of sleep, but I always dream about my home."

His wish was gratified. By the kind intervention of friends his *Lepidoptera* and his books were preserved for him, an annuity was provided sufficient for his modest requirements, and he was permitted to end his days in the old home he loved so well. His gratitude was unbounded; and on his return to Epping, all business being abandoned, he devoted himself again to his old pursuits. His spirits revived, his health seemed to improve; and he was able to produce, in 1873, his second supplement to his 'Catalogue of British *Lepidoptera*.' But it was not for long: and the end came on the 29th of June, 1875.

He lived and died a bachelor. For nearly thirty years a distant cousin and faithful friend ministered to his household wants. Ann Main was to the Recluse of Epping as Judith Bubb to the Man of Ross.

In the very centre of the secluded little burial-ground

which lies behind the Friends' Meeting House, at Epping Street, a plain flat stone bears the simple inscription:—

HENRY DOUBLEDAY,
DIED
29TH OF 6TH MONTH,
1875,
AGED 66 YEARS.

The Meeting House itself is so hidden by the dark foliage of pines that few strangers passing through the town would become aware of its existence: and in the ground behind it our friend has found a fitting resting-place at the end of his peaceful life.

Doubleday paid comparatively little attention to the *Tineina*; but, making all allowance for this, it may be safely said that no such collection of British *Lepidoptera* was ever before made. Whether regarded in respect of its completeness in species, the number and condition of the specimens, and the extent of variation exhibited, it stood unrivalled. It was simply splendid. Happily it remains intact; and together with his collection of European species is, for the present at least, deposited at the Bethnal Green Museum, on loan, and has been placed under the custodianship of Mr. Andrew Murray. Of the two thousand one hundred recorded species of British *Lepidoptera*, nearly two thousand are represented, the whole being arranged in four cabinets, containing together one hundred and six drawers, in the exact order in which Doubleday left them. A room has been specially provided for the "Doubleday Collection," and an attendant is in readiness to show it at all times that the museum is open, viz. Monday, Tuesday, and Saturday, from 10 a.m. to 9.30 p.m.; and on Wednesday, Thursday, and Friday, from 10 a.m. until dusk.

It would be affectation to claim for Henry Doubleday a high position among scientific men, or to pretend that he had laid down any philosophic landmark for all time. He was a lover of Nature for her own sake; and, as a naturalist, he was a careful and accurate observer of habits, an ardent collector, and had a good eye for the discrimination of species. As a man, he was remarkable for his gentleness and modesty, for his unselfishness and liberality, for his love of truth and consideration for the feelings and opinions of others.

To those who knew him best his memory will be dearest;

but so secluded was his life, so much did he shun society, that those who knew him personally will soon be few in number. The accompanying likeness is from a photograph taken about 1857. It fairly recalls his presence as he was, though it scarcely reveals the cheerfulness and humour which peeped through his reserved exterior. In his life there were no exciting incidents to tell; but in writing this memoir I have striven to bring out the character of the man, to describe him as I found him,—one of Nature's gentlemen,—to whom may fitly be applied the words, from John Ray's tomb at Black Notley :—

“Non sanguine et genere insignis, sed quod majus, propria virtute illustris. De opibus titulisque obtinendis parum sollicitus, hæc potius mereri voluit quam adipisci: dum sub privato lare, sua sorte contentus (fortuna lautiori dignus) consenuit. In rebus aliis sibi modum facile imposuit, in studiis nullum.”

NOTES ON NEW AND RARE SPECIES OF ACULEATE HYMENOPTERA, TAKEN DURING 1874, 1875, 1876.

By FREDERICK SMITH.

WHEN the ‘Entomologist’s Annual’ terminated its career it had been the means of recording discoveries of new species, and also of making known localities where species of rarity might be found: it had done this during a period of twenty years. Entomologists are greatly indebted to Mr. Stainton for carrying on this annual record of entomological campaigns. Interesting discoveries are, it is true, reported in the ‘Entomologist,’ and also in the ‘Entom. Mo. Magazine;’ but neither of these publications have brought these matters into a focus as they were formerly in the ‘Entomologist’s Annual.’

It might be imagined that during the three years which have elapsed since the cessation of the Annual many new species of *Aculeate Hymenoptera* must have been discovered. This, however, is not the case: two or three, new to the British list, have been found, and several captures of rarities have been made; in addition to which various interesting discoveries, in connection with recorded species, have occurred. At the time of the publication of my work

on the 'Bees of Great Britain,' *Colletes cunicularia* had not been discovered in this country; but fourteen years afterwards, in 1869, it was found near Liverpool. In the following spring Mr. Carrington forwarded a number of this bee alive: these I took to Shirley Common, where, selecting a suitable situation, I made a number of burrows in a sandy slope, into each of which I put a male and a female bee, in the hope of establishing a colony. I was not very sanguine of success, having tried similar experiments with other insects. I brought *Philanthus triangulum* from the Isle of Wight, *Mellinus sabulosus* from Suffolk, and in both cases I failed to establish the species in a new locality; probably if I had dug the insects out of their burrows, instead of taking them on the wing, I should have had a better chance of success. My endeavour to localise the *Colletes cunicularia*, to my great satisfaction, proved a success: a young entomologist brought to me twelve months afterwards a box of bees for examination; among them I found two specimens of the *Colletes*, which he told me he captured on Shirley Common, describing the situation in which he found them. This was the very spot where I had left them. This success is worthy of being recorded, it being the only instance that has come to my knowledge in which complete success has attended such an experiment. I am warranted in saying complete, because Mr. Carrington, who supplied me with the living bees, last year took the *Colletes* himself at the new locality at Shirley.

Andrena ferox—one of the rarest species of the genus to which it belongs, and which has only previously been taken near Bristol—was found last summer, by Mr. E. A. Butler, at Guestling, near Hastings. Another of the rarest of our British bees, *Macropis labiata*, has also occurred near Norwich. The first specimen of this bee, of which we have any record of its being found in England, is one in the collection of the British Museum. For many years this was unique: it was taken by Dr. Leach, in Devonshire, probably half a century ago. Some five and twenty years subsequent to Dr. Leach's capture, a second specimen was taken by Mr. John Walton, in the New Forest: this was deposited in the Shuckardian collection, which perished on its transit from London to Bristol on the Great Western Railway. In 1842 Mr. S. Stevens took a third example, at Weybridge, on the

3rd of August. I have searched for the species at this locality on many occasions, but without success. The three captures enumerated consisted of males. A period of thirty years now elapsed in the history of the captures of *Macropis*, when, in 1874, Mr. Bridgman obtained two males at Brundall, near Norwich; and last summer he succeeded in capturing seven more at the same locality. It is certainly a remarkable fact that no one has succeeded in finding the female, and this circumstance might lead to the inference of the habit of the female having some peculiarity not observable in the other sex: this, however, does not appear to be the case. The males captured last summer, at Brundall, were frequenting the creeping thistle, *Carduus arvensis*; and both sexes have been captured on that plant in Germany. Leon Dufour took them on *Alisma plantago*, and Professor Schenck finds them on the leaves of the dewberry, *Rubus cæsius*. Let us hope that it is reserved for Mr. Bridgman to complete the capture of the species by taking the female next summer.

PANURGUS DENTIPES, *Latr.*,

is now added to the British list, not by a recent capture, but on the authority of a specimen bearing the locality, Salisbury, which I discovered among the males of *P. calcaratus*, in the collection of British bees in the British Museum. This species is not rare on the Continent, and will probably be found at the locality mentioned. I had the pleasure of including this species, in the genus to which it belongs, in the second edition of my work on 'British Bees,' recently published by the Trustees of the British Museum.

NOMADA BRIDGMANIANA, *Smith.*

In the same work will be found described a species of the genus *Nomada* new to science: *Nomada Bridgmaniana*, discovered by Mr. Bridgman, near Norwich. The species is nearly allied to *N. lateralis*, and is one of the prettiest species of the genus.

OSMIA FUCIFORMIS, *Latr.*

In the work alluded to above, another species, *Osmia fuciformis*, is added to the list. In the first edition of the

book I regarded the only examples of the *Osmia* I had seen—two, in my own collection—as small varieties of *O. xanthomelana*. Since that time I have received numerous specimens from Germany; and Dr. Gerstaecker has pointed out the distinguishing characters, which, although slight, are constant. The specimens in my own collection I captured some years ago at Birch Wood; and recently, on examining a box of bees belonging to Mr. G. Waterhouse, I found a single specimen of this species, which was taken at the same locality as my own.

MUTILLA EUROPEA, Linn.

During last autumn *Mutilla Europæa* was found in several nests of *Bombus muscorum*, by Miss Madeline Pasley, near Wickham, Hants. The specimens of this parasite were kindly forwarded to me; and on the day subsequent to their reception, Prof. Brandt, of St. Petersburg, informed me that he had found them also in the nests of the same species of *Bombus* in Russia. I have at various times taken scores of nests of *B. muscorum*, and also of other surface builders, but I never had the good fortune to find the parasite. I suspect that *Mutilla* more frequently infests the nests of the underground builders in this country.

POMPILUS APPROXIMATUS, Smith.

In addition to the nine recorded British species of the genus *Pompilus* I have to add a tenth, taken by Dr. David Sharp, in Dumfries. It closely resembles *P. niger*, but it is a larger insect: its mandibles are entirely black, except the extreme apex, which is obscurely rufo-piceous. *P. niger* has three teeth in the mandibles, one large and two small ones. The new species has a single tooth, which is only slightly notched inwardly; the third submarginal cell is quadrilateral, and is considerably larger than the second submarginal, and the nervures of the wings are much stronger than in *P. niger*. The latter insect always has the third submarginal cell either triangular or petiolated: in the male that cell appears to be always petiolated. The distinctions enumerated will serve to distinguish the new species: I propose to name it *Pompilus approximatus*.

One of our rarest species of *Fossorial Hymenoptera* is the *Astata stigma* of Panzer. I was fortunate in first discovering it in this country, at Weybridge, in 1845, when I captured two females; ten years subsequently I took another pair at Deal; and in 1875 I took three more females at Barmouth, North Wales: all occurring in the month of August. Last summer Mr. Edward Saunders took two males near Chobham. This species of *Astata* is very like *Tachytes pompiliformis*, the size and colouring of the two insects being the same: the different neurulation of the anterior wings would separate them. The vertex of *Astata* is convex, smooth, and shining, and has three distinct ocelli: the male has large approximate eyes that occupy the larger part of the head; it has also a transverse white spot above the insertion of the antennæ.

Oxybelus mucronatus, an exceedingly rare and local species, was taken by myself in August, 1875, at Barmouth: its previous known localities are sandy spots near Bristol, Braunton Burrows, and Deal. Of the genus *Oxybelus* there are four species described, for the first time, in Shuckard's 'Fossorial Hymenoptera,' in 1837, all supposed to have been taken in Devonshire by Dr. Leach, the types being in the British Museum: not a specimen of any of these has been subsequently taken, neither have I seen one in any collection of European *Hymenoptera*. A fifth species stood in the same category, until Mr. Samuel Stevens took a specimen in Devonshire. This species, however, *O. nigripes*, is found on the Continent; but hitherto only the two specimens referred to have been taken in this country.

One of the rarest British species of the genus *Crabro* is *C. signatus*: a male was taken in Tilgate Forest, by Mr. T. N. Hoey, last August. Only a single example of this insect had, to my knowledge, been previously taken in England: it was captured by Mr. Dossetor in Cline Wood, near Swansey, nearly twenty years ago. In general resemblance this species comes near to *C. vagabundus*, particularly to those examples that have the yellow bands much interrupted. *C. signatus* has the enclosed space at the base of the metathorax smooth and shining, and it has a minute tooth near the base of the posterior femora, a little within. The female has not been found in this country, but it is described in my work on the British *Fossores* from a foreign specimen.

CRABRO AMBIGUUS, Dalhbm.

It is now a rare occurrence to have the pleasure of making known the capture of a new British species of *Aculeata*; but a species of the genus *Crabro*, new to the fauna of this country, has been taken by Mr. Vincent R. Perkins. That gentleman submitted to me, for inspection, a box of small species of *Hymenoptera*: among them I found four specimens that I could not refer to any described in my work on these insects. The specimens were males, and belonged to the division in which that sex has dilated anterior tarsi. I could not find the species described either in Van der Linden's work on the *Fossores*, or in that of St. Fargeau; but at last I discovered it to be described by Dalhbm in his 'Hymenoptera Europæa.' It is that author's *Crabro ambiguus*. The specimen may be recognised by the male having the anterior tibiæ clavate, and the first joint of the tarsi broadly expanded, outwardly convex, and having three black spots on it; the second joint is small, broader than long, and has a minute black spot in the middle of its apical margin. I give descriptions of both sexes, that of the female being compiled from Dalhbm's work.

Male.—Length $2\frac{3}{4}$ lines. Black, smooth, and shining; the head narrowed behind the eyes; the posterior margin of the vertex acutely margined, terminating laterally in an acute angle or tooth; the ocelli in an equilateral triangle on the vertex; at the sides of the posterior pair, an oblique fossulet, that extends to the margin of the eyes; in front of the anterior ocellus, a deep, longitudinal, impressed line, runs to the insertion of the antennæ; the clypeus covered with silvery pubescence; the mandibles black, longitudinally channelled, with two acute teeth at their apex, which is rufo-piceous; the antennæ black. Thorax, above, shining; the enclosed space at the base of the metathorax smooth and shining, having a deep longitudinal channel, and a few oblique striæ at its base; the metathorax is transversely striated posteriorly; the anterior tibiæ clavate, yellow in front and at the apex; the tarsi white; the first joint flattened and broadly dilated, straight in front and rounded behind; convex outwardly, and having three black spots; the second joint small, cordate, and with a minute black spot in the

middle of its anterior margin; the apical joint black; the intermediate tarsi white, with the extreme apex of each joint black; the posterior tibiæ clavate, with their extreme base, as well as the spines at their apex, pale testaceous. Abdomen subclavate.

Female.—The size of the male, but more robust; the clypeus, with the anterior margin, widely and slightly emarginate, with four minute teeth in the emargination, the two central ones more prominent than the lateral ones; the clypeus covered with silvery pubescence; the mandibles have a pale yellow line, with their apex rufo-piceous; the anterior tibiæ yellow in front, and the intermediate ones fuscous at their base and apex; the posterior coxæ pale testaceous at their apex; the tibiæ subclavate, and pale yellow at their base; the tarsi whitish at the base. Abdomen oblong-ovate, the apex rufo-fuscous.

ODYNERUS RENIFORMIS, *Gmelin*

Another fine addition to the British *Aculeata* has been made by the discovery of a species of wasp, new to our insect fauna, the *Odynerus reniformis*. This insect was discovered by Mr. Edward Saunders, near Chobham, Surrey. The male only has been taken: it bears a close general resemblance to *Odynerus lævipes*, which species was discovered some years ago, within a few miles of Chobham, burrowing in bramble sticks. The new species may possibly have the same habit. The male of *O. reniformis* is distinguishable from all the other males of our British species, by having a long yellow spine on each intermediate coxa. Herrich-Schäffer has described this species under the name of *Pterochilus coxalis*. The female is said to resemble that of *Odynerus spinipes*.

27, Richmond Crescent, Barnsbury,
February, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from vol. ix. p. 269.)

62. *Neuroterus numismatis*, Ol. (N. Réaumur, H.).—This most beautiful of all the lenticular galls (*Linsengallen*)

appears in July on *Quercus sessiliflora*, *pedunculata*, and *pubescens*. It is produced on the under side of the leaf as a small, flat disk, adhering to the leaf in one point only; the

Fig. 62.



NEUROTERUS NUMISMATUS.

outside margin soon thickens, until the mature spherical gall obtains a diameter of three millimetres. The gall is flat next the leaf; the upper part, however, is convex, and considerably indented in the centre; its brown surface is covered with light brown, smooth, silky hairs, which are turned outwards: the interior of the gall contains a small larva-cell. The galls fall

in October and November, pass the winter on the ground where they still continue to swell, and the fly appears in February and March. In the neighbourhood of Vienna the galls are rare, but frequently to be met with in the Leithagebirge mountains. I have received it from Herr Kichner from the district of Budweis, and from Herr Forel from the borders of the lake of Geneva.—G. L. MAYR.

We now come to a genus of *Cynipidæ*, the productions of which are well marked as a class, for who has not noticed the oak-leaves in autumn, crowded, so to speak, with little round fungus-looking objects on their under side. It is these which are the galls occasioned by the *Neuroteri*; and for some time their nature was a very fertile subject of dispute amongst naturalists; the botanists holding, I believe, to their fungoid or lichenous nature; while the zoologists had a belief in their indebtedness to insect agency. Their vegetal nature was evident; not so the insect, which is almost or quite imperceptible, until the galls fall from the leaf in the autumn, for it is during the winter and spring that the galls, of *lenticularis* and *fumipennis* more particularly, swell, and the larvæ feed up and change into the pupa state; the gall-makers are evolved about March. It was Réaumur who first discovered the little larva under the galls, and thus set at rest the question of their production. Westwood ('Arboretum Britannicum,' p. 1827) and Smith (Trans. Ent. Soc., London, vol. ii., Proceedings, p. xlii.) were the first to notice it in this country. The genus *Neuroterus*, like *Cynips* and some few

others, contains all agamous species. Hartig bred *N. parasiticus* from the gall of *A. globuli*, and *N. inquilinus* from that of *D. scutellaris*; but these differ somewhat in structure, as well as habits, from the typical *Neuroteri*, and have very properly been transferred to a separate genus (it was partly done by Hartig himself), leaving *Neuroterus* with only gall-producing species. *N. numismatis*, the species more especially under consideration, is the maker of the beautiful "silky-button" galls, so abundant everywhere under oak-leaves in September and October; it is generally found in company with the following species, often interspersed with it, on the same leaf, but the gall-maker appears to attain the penultimate or pupa state somewhat earlier than its congeners. I can speak to this of my own observation, but prefer to give Schlechtendal's dates, which are as follows:—"Galls collected on the 3rd November, when opened on the 11th already contained pupæ with coloured eyes; on the 13th December these pupæ were coloured throughout, and the flies emerged on the 15th." This occurred with galls kept in-doors. And he further says the 14th February was the first appearance made by a *Neuroterus* of its own accord. These galls are generally distributed in Britain, having been recorded as far north as the Cheviots, Perth, and Aberdeen. Only one species of *Synergus* is known to inhabit these galls, viz. *S. Tscheki* (Mayr), which appears in March. Specimens of this inquiline were no doubt taken for the true gall-maker by Walker, who says:—"Last year (1845) I reared from these galls two hundred and fifteen flies, of which there were fifty-seven males and one hundred and fifty-eight females." (Zool. iv. 1457.) The list of *Chalcidiæ* bred at the same time, and given by Walker, is as follows:—"June (second year): *Callimome mutabilis*, one male; *Platymesopus tibialis*, one male. July: *Eurytoma curta*, one male and one female; *E. Æthiops* (Boheman), one female; *Callimome mutabilis*, eight males and twelve females; *C. inconstans*, one female; *C. geranii*, one female; *Pteromalus domesticus*, one female. August: *Eurytoma curta*, one female; *Callimome mutabilis*, one female; *Eupelmus urozonus*, one female." I have bred *Pleurotropis sosarmus* in May. Dr. Mayr does not seem to have been so well acquainted with this gall, as from its great abundance and general distribution in this country we should

imagine, as few are the galls from which he has received no record of parasitism as affected by the *Torymidæ*,—those general controllers of gall-life. However, this species is one of the few, and none of Walker's three are confirmed.*—
E. A. FITCH.

NOTES ON LYCÆNA ARION.

By GERVASE F. MATHEW, R.N., F.L.S., F.Z.S.

(Continued from p. 40.)

ON July 8th, 1875, I left Dartmouth by the evening coach, intending to go as far as Kingsbridge, sleep there the night, and take the steamer to Salcombe the next morning; but in the course of the journey one of my fellow-passengers observed that he was going to Salcombe that night, and had ordered a boat to be waiting for him at Frogmore, a little village between Torcross and Kingsbridge, where an arm of the estuary nearly touches the high-road. He kindly offered me a passage, which of course I gladly accepted, as it would save me some distance and expense; also giving a clear day to start with on the morrow. Accordingly on reaching Frogmore we bade farewell to the coach, jumped into the boat which was waiting, and had a pleasant pull down the creek to Salcombe, where we arrived at half-past eight. I put up at my old quarters, the Victoria Inn.

The next morning when I got up, a little before seven, hoping to have a good long day before me, I was wofully disappointed at finding it was raining heavily, with but little prospect of a change. At ten o'clock it became lighter, a slight break appeared in the clouds, and it ceased to rain; so I sallied forth towards Bolthead. However, this was but the forerunner of a more furious downpour, for I had scarcely gone half-way when the rain descended again in perfect torrents. I had to return in a soaking condition to my inn. There was no change for the remainder of the day; the rain poured without intermission. During the afternoon I came to the conclusion that whatever Salcombe might be in fair

* At my request Mr. G. B. Rothera kindly sent me what insects he had bred from the galls of this species. They were as follows:—6th March, 1874, one *Callimome*, sp. ? (male); 15th, twenty-four *N. numismatis*; 15th, thirty-six *N. numismatis*; 21st, eighty-four *N. numismatis*; 2nd May, forty-four *P. esearmus*. The peculiarity of this record is the absence of *Synergi*.—E. A. F.

weather, it was anything but a lively place to spend a wet day in—at least by oneself.

The following morning when I awoke it was fine, but I noticed from my bed-room window broken clouds flying at a great pace across the sky. After breakfast, when I had walked beyond the shelter of the town, I discovered that the rain of the preceding day had given place to a fresh gale from the south-west. On reaching the favourite locality for *Lycæna Arion* I found the wind so strong it would have been impossible for a butterfly to face it; indeed, in some places I could barely stand, so gave up all hope of capturing any by ordinary means; but I thought that by searching to the leeward of bushes and patches of high fern I might possibly find some sheltering. Several hours hard, back-aching work only produced a few *Argynnis Aglaia*, *Satyrus Semele*, and *S. Janira*, many of which upon being disturbed were carried off by the wind at a tremendous pace. I gave it up as a bad job, and returned to Salcombe. Thus ended my second expedition of 1875, for the next day I had to return early to Dartmouth.

It will be noticed that I did not observe a single perfect insect myself that year, but this, in a great measure, was owing to the unfortunate state of the weather at the time of my second visit. A collector who visited the locality a few days later, when the weather was more favourable, took about a dozen worn specimens.

I was unable to go and have another search for larvæ of *Lycæna Arion* in the spring of 1876; but on the 14th July I left Dartmouth by coach for Kingsbridge, and from thence went on by boat to Salcombe, where I arrived about half-past three in the afternoon. The day was most lovely, the sky clear, and heat almost tropical. As soon as I had deposited my luggage at the Victoria Inn I set out for Bolthead. On getting there I saw nothing whatever of *Arion*, but was not much surprised at this, for it is a butterfly that does not fly much after mid-day, and it was nearly five o'clock before I reached its favourite habitat. *Satyrus Semele* and *S. Janira* were very abundant, as was also *Argynnis Aglaia*; but there was nothing like the assembly I witnessed here in July, 1870. Indeed, in this locality I doubt if such a thing will be seen again.

The next morning (July 15th) was most glorious, and after bathing and breakfasting I strolled out to the cliffs, and spent nearly the whole of the day there. The weather was all that could be desired for butterflies,—bright, hot, and cloudless, with scarcely a breath of air; indeed the heat was almost too excessive for active exercise. Had there been many *Lycæna Arion* in existence surely they would have been about on such a day as this, but I only saw five,—one male and four females; and those captured were all considerably worn. The species might have been out for some days, and was passing, which would probably account for my seeing so few. I hoped this was the case; but from information I gathered from persons living in the neighbourhood I fear it is becoming scarcer each season. At any rate, it will be seen from the above that since my first visit, in 1870, it has notably diminished. The question naturally arises as to the cause of this decrease. An entomologist, whom I met on the ground, gave it as his opinion that the chief cause was attributable to burning the heather and gorse in early spring; but this only occurs at intervals of several years, and takes place in patches. Moreover, this burning has perhaps been going on for ages; so I do not think this can be looked upon as the principal reason, although no doubt a considerable number on a limited area may thus perish. My belief is that the ruthless manner in which they are indiscriminately captured and destroyed, by entomologists and collectors, is the primary cause of their annual diminution. I feel convinced if they were left to themselves, and strictly preserved for four or five years, they would become as plentiful again as ever. Now, not a year passes without the place being overrun by collectors; and I was told by a coastguard man, who had been for some years stationed at Salcombe, that he has often seen five or six gentlemen together "hunting flies." I have seldom been there myself without seeing someone, although those I have been fortunate to meet would, I am certain, only take what number of specimens they actually required, and allow the ragged females to fly. Al! however, I am sorry to say, would not be so scrupulous; and they, as I have before mentioned, kill worn specimens in their nets, and afterwards throw them away. That this is often done in pure thoughtlessness, I feel positive.

Should this notice meet the eyes of any entomologists who may hereafter visit Bolthead, may I implore them to spare these wasted females, for it seems a great pity that such a beautiful species should become extinct in this locality, simply for the want of a little proper care.

Since I was at Salcombe in July, 1875, a bird-stuffer's shop has been opened in the town. I paid the owner a visit to enquire if he had any rarities; and after looking at his birds I asked him if he collected butterflies. He replied that he did, and showed me about two dozen *Lycæna Arion* on a board. They were nearly all females, badly set, and in wretched condition; there was not a single specimen fit for a cabinet. Mr. Nicholls, of Kingsbridge, who has long known *Arion*,—in fact, discovered it, I believe, in this locality,—tells me that he is of opinion it is fast becoming exterminated.

H.M.S. "Britannia," Dartmouth,
January 8, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DANAIS ARCHIPPUS IN SUSSEX.—Another specimen of *Danais Archippus* has been taken in England. Through the kindness of my friend Mr. H. Cooke, of Brighton, I had the pleasure of exhibiting a fine example of this very beautiful butterfly at the last meeting of the Entomological Society. This specimen was captured during the second week in September, 1876, by Mr. Alfred Wood, of New Close, Keymer, Sussex, about four miles from Hassocks Gate. When taken it was flying over clover.—FREDERICK BOND; Staines, Middlesex, February 9, 1877.

[There is no place in Sussex better known to me than New Close. It was the residence of my father-in-law for nearly fifty years. I should think the distance is about five miles from Hayward's Heath, where the other Sussex specimen was taken by the Rev. T. Crallan (Entom. ix. 264).—J. J. W.]

ZYGÆNA FILIPENDULÆ (yellow var.).—I have received some half-dozen specimens of *Zygæna filipendulæ* (yellow var.), taken during the summer by my cousin, Mr. A. W. Bairstow. They were discovered in a chalk-pit at Cambridge, along

with the ordinary type, and it is surprising to find that a variety is so regular in the markings of different specimens. They appear to be somewhat common in the vicinity.—S. D. BAIRSTOW; Woodland Mount, Huddersfield.

NOTE ON *IODIS VERNARIA*.—The powerful attraction possessed by a newly-emerged female *Bombyx* is known to every observant entomologist; but that *Geometra* occasionally exhibit a similar power is, so far as my experience goes, much less generally known. About daybreak on the morning of the 13th July last, as my friend, Mr. W. J. Argent, and I were returning from a night's sugaring in Darenth Wood, our attention was arrested by a ghostly fluttering on the hedge-bank, which proved to be an assemblage of males of *Iodis vernaria*. So common were they, that one stroke of the net enclosed six, and many were left. The night had been a most unproductive one at sugar, and very little had been seen on the wing: certainly not one *I. vernaria*, the season for which was getting late. Since this occurrence one or two other instances of similar gatherings have been mentioned to me.—BERNARD COOPER; Fern Lodge, Higham Hill, Walthamstow.

PSEUDOPTERPNA CYTISARIA.—I was rather surprised to find the larvæ of this species feeding last June upon common furze (*Ulex europæus*), as well as upon needle-whin (*Genista anglica*) and broom (*Sarothamnus scoparius*).—W. MACHIN.

ACRONYCTA ALNI.—A fine full-grown larva fell into my net while beating the wych elm (*Ulmus montana*) last year, but I sadly fear it has come to grief through an atrocious *Ichneumon*.—F. O. STANDISH; Cheltenham.

ACRONYCTA ALNI (Entom. x. 31).—One more should be added to the seventeen captures of this scarce and beautiful *Noctua*, which are recorded in the summary of British *Lepidoptera*. It will increase the number taken in Hants to three. In June, 1874, Mr. James Gulliver secured at sugar, in the New Forest, a remarkably fine specimen, which is now in my possession. It was the only insect he saw that night at sugar, during a somewhat long round.—JOSEPH ANDERSON, jun.; Chichester.

FOOD OF *TORTRIX VIBURNANA*.—I have repeatedly reared *T. viburnana* from larvæ and pupæ spun up in the leaves of *Teucrium scorodonia* (wood-sage), collected in the Warren,

at Folkestone; so it would appear that its food-plants are various.—F. O. STANDISH; Cheltenham, February, 1877.

GELECHIDÆ REARED IN 1876.—*Gelechia næviferella*.—I reared a large series from larvæ found in August, making conspicuous white blotches in leaves of *Chenopodium*: when full grown they descend into the earth to form their cocoons, the imagos appearing the following May. *G. Hermannella*.—The larvæ of this pretty species I found in profusion in the middle of July, mining the leaves of *Chenopodium*, and reared the perfect insects freely in August; the larvæ were again equally plentiful at the end of that month and the early part of September, thus proving it to be double-brooded; the mine of this larva is very different from that of the preceding species, being hardly perceptible, unless the leaf is held against the light. *G. triparella*.—I reared about forty specimens in May, from larvæ found feeding between united oak leaves, at the end of August; they are not uncommon on stunted scrubby oak bushes in lanes, near Wanstead.—W. MACHIN; 22, Argyle Road, Carlton Square, E., January, 1877.

TINEINA BRED DURING 1876.—*Lampronia Luzella* appeared in one of my large boxes of dead leaves and rubbish, collected during the winter. Its history is still as little known as ever.

L. prælatella was bred from larvæ collected April 8th, amongst wild strawberry. They are easily reared in a flower-pot; nearly all were bred that were collected.

Micropteryx calthella, like *L. Luzella*, crept up in the same box, and afforded no more information.

Eidophasia Messingiella is difficult to find, but easy to rear; some scores of the larvæ were collected, May 13th, at Brockholes Wood, near Preston, on *Cardamine amara*; they spin a few strands of silk across the young shoots, and draw them together, leaving no other indication of their presence.

Depressaria nanatella occurs in profusion amongst carline thistles, at Lytham, and is very easily detected, as when the larva attacks a leaf it draws the two edges together, thus exposing the white, shiny under surface, and feeds in the roll thus made. They are full fed about May 21st.

D. atomella were not plentiful this year. They inhabit the

shoots of *Genista tinctoria*, near Preston, about the beginning of June, and are easily bred.

Gelechia diffiniella, along with *G. tenebrella* and *G. tenebrosella*, are plentiful wherever the little sheep's sorrel (*Rumex acetosella*) grows, and are best obtained by taking away a small bag-full of the plant, which is so plentiful that there is no fear of extermination. I cannot help thinking that the difference between the two latter species is only sexual; they are always together wherever I have taken them.

G. viscariella is scarce; but by nipping off suspicious-looking *Lychnis* heads, and examining them at home, a few were bred. *Lychnis diurna* appears to be the favourite plant.

G. ligulella or *G. vorticella*, from *Lotus corniculatus*. What is the difference between them? I shall be obliged by information from anyone, or would gladly exchange insects for a specimen of each.—J. H. THRELFALL; 4, East Cliff, Preston, December, 1876.

ANSWERS TO CORRESPONDENTS.

J. T. WILLIS.—COMPLETE LIST OF EXOTIC LEPIDOPTERA. —Would you kindly inform me, through the pages of the 'Entomologist,' if there is published a complete list of exotic *Lepidoptera*, and where I could obtain it?

[We are not aware of any complete list of *Lepidoptera* of the world. There is one of the butterflies of the world,—a perfect monument of patient labour,—by Mr. W. F. Kirby, of the Royal Dublin Society, to whom we cannot do better than refer our correspondent.—ED.]

S. G.—We use, and recommend, a 'Manual of British Botany,' by Professor Babington, of Cambridge. Seventh edition, 1874. London: Van Voorst. Price 10s. 6d. For those who are not proficient botanists we, in addition, suggest an 'Illustrated Manual of Botanic Terms,' by Dr. M. C. Cooke. London: Hardwick & Co. Price 2s. 6d. Also, a 'Manual of Structural Botany,' illustrated, by Dr. M. C. Cooke. London: Hardwick & Co. Price 1s. We take this opportunity of reminding many of our correspondents how exceedingly useful is even a limited knowledge of Botany to those who study Entomology.—ED.

REVIEW.

Catalogue of British Hymenoptera in the British Museum.

Part I.—ANDRENIDÆ and APIDÆ. Second edition. By FREDERICK SMITH, Assistant Keeper of the Department of Zoology. Lond., 1876. Published by order of the Trustees.

It is twenty-one years since the first edition of this standard work of reference was published. That edition was written by the present author after twenty years of intimacy with his subject, for so far back—as he himself told us—do his continuous observations date. To that long period we have now added in this second edition the result of another twenty-one years of unremitted care and study. Such is the experience which eminently qualifies the author to commend to his readers a theme in itself so attractive as the British Bees.

Following a rule of the British Museum, this book is called a "Catalogue;" but such a title is rather apt to mislead the uninitiated, who may pass it as simply a dry list of names of the species contained in the National Collection. This is not the case, for it is a most interesting and elaborate monograph of two divisions of the *Aculeate Hymenoptera*.

Apart from its scientific value, this work contains much simple and readable Natural-History writing of such a pleasant character that the student will find many a paragraph, the interest of which will lighten his labours while identifying species. For instance, of the *Andrenidæ*, Mr. Smith says:—

"The bees included in the genus *Andrena* may be called the harbingers of spring. One of the first to appear is *A. Clarkella*: this species has been observed as early as March 4th, before the snow had quite melted, and when unusually warm weather had set in; *A. gwynana* was found at the same time at Hampstead. The usual time when the *Andrenidæ* make their appearance is April, early or otherwise, according to the suitableness of the weather."—P. 21. * * * "These bees are subject to the attacks of parasites. The first to be remarked upon are those bees which compose the genus *Nomada*: they are more popularly known as wasp-bees, since they bear a considerable resemblance to some of the small solitary species of that family. These parasites appear to be upon a perfectly friendly footing with the industrious bees, and are permitted, without let or hindrance, to enter their burrows. It has been advanced as a proof of the ingenuity and artifice necessary to be employed in effecting the deposit of their eggs in the working bees' nests, that the parasites should bear a close resemblance to the bees upon which they are

parasitic. Some instances may undoubtedly be advanced, as *Apathus* and *Bombus*, and also in the different species of *Volucella*, which infest the nests of humble-bees; but amongst the solitary bees no such resemblance is required to aid in any necessary deception."—P. 22. * * * "I have on several occasions watched with much enjoyment a large colony of *Eucera longicornis*, the males occasionally darting forwards with great velocity, then turning sharply round, and, as it were, swimming in circles close to the ground, then darting off again and again in an unceasing round of sportive enjoyment; their industrious partners, whose whole existence appears to be bound up in one unceasing round of labour, would occasionally return home laden with food for their young progeny. Sometimes it would happen that a *Nomada* had previously entered her nest. When such proved to be the case she would issue from it, and flying off to a short distance wait patiently until the parasite came forth, when she would re-enter and deposit her burden."—P. 22.

The author very justly says, "If I were asked which genus of bees would afford most abundant and interesting materials for an essay on diversity of instinct, I should, without hesitation, point out the genus *Osmia*." His introductory remarks to this genus do indeed form such an essay. From it we cannot do better than quote the following, as a curious example of delayed development under certain circumstances:—

"There is another species of this genus, whose habits are so different from the rest that our admiration of the ingenuity of these bees is greatly increased when we consider its curious details, and reflect upon the degree of care and foresight exhibited by the provident parent: this is the *Osmia parietina*, a bee only as yet found in the northern parts of this country. This species selects the under side of a slate or stone lying on the ground, and having a hollow space beneath; to the under side of such stone the bee attaches little masses of pollen and honey; on each she deposits an egg, from which a larva is hatched in a few days, which feeds upon the provision stored for it by its provident parent. A stone of this kind was found in 1849 at Glen Almond, Perthshire, on the Grampians, at an elevation of eight hundred feet above the level of the sea, by Mr. J. Robertson, who, on turning up the stone, observed a mass of cocoons of some insect. Although not possessing much knowledge of Entomology, still he knew them to be the production of some insect. He presented the stone to the British Museum, and it was placed in my hands for observation. The size of the slab was ten inches by six, and the number of cocoons attached to it two hundred and thirty. When first discovered about one-third of them were empty: this was in the month of November. In the beginning of the following March (1850) a few males made their

appearance, and shortly afterwards a few females were developed. They continued to come forth at intervals until the end of June: at this time there remained thirty-five undeveloped cocoons. On opening one or to two, in 1851, they proved to contain living larvæ. These cocoons were again carefully closed, and the whole left undisturbed until the month of April of the following year (1852), when on examination they were found still to contain living larvæ. At the end of May these changed to pupæ, which about the end of June became perfect insects, when both sexes made their appearance. This, then, was the result: a portion of eggs deposited in 1849 had been three years arriving at maturity, or rather, in all probability, their development had been retarded; when discovered in 1849 one-third of the cocoons were found to be empty; in 1850 a few males and females appeared; in 1851 the same occurrence took place, and then the stone was presented to the British Museum, and placed in my hands for observation; in April, 1852, all the rest of the cocoons produced bees or parasites, the latter proving to be a species of ruby-tailed fly, *Chrysis bicolor*, a species new to the British list. In the first instance all the deposit was subjected to the same influences, and had produced larvæ. The same may be said of them when taken by Mr. Robertson to Edinburgh; and yet only a few of each sex were developed. The following year produced the same result; and the third year the rest appeared. What was the cause of this retarded development it is difficult to conceive."—P. 150.

In his prefatory remarks to the genus *Saropoda*, Mr. Smith reminds us of rare times of luxurious idleness, when we have laid upon thyme-scented banks, conscious only of perfect quietness and rest, after the fatiguing work of a hot morning's collecting. Then have we been awakened from our day-dream by the busy hum of these lively insects:—

"Of all the busy bees that revel in the beauty of a summer's day, *Saropoda bimaculata* must ever be an especial favourite. It is only to be found when it is sunniest, brightest, and hottest,—when summer days are summer days indeed. Who has not heard its merry hum? Who has not seen it, when for a moment it settles on a flower, or rests on some sunny bank panting with delight? the eyes splendid as opals: could their brilliancy be preserved, this bee would rival and challenge admiration with the most brilliant of its tribe. It is a local species, but abounds in many localities. It flies with incredible swiftness, darting from flower to flower with the rapidity of lightning; again settling, it resumes its loud and cheerful note, merry and joyous as the cricket on the hearth."—P. 185.

In introducing the important *Bombi* (humble-bees), Mr. Smith says:—

"An interesting feature in the history of the *Bombi* is the varied temperament of the different species, and the degrees of pugnacity with which some species will resent any attempt to invade their domiciles. Nests of the surface-builders may be taken almost with impunity, whilst such an outrage on the under-ground ones would be a dangerous undertaking. No species is more courageous than *B. lapidarius*, and *B. virginalis* is equally formidable. This relates to such attempts being made in the height of the season; later, in the autumn, the bees lose their courage, and offer little, if any, resistance to attack on their habitations."—P. 198.

Limited space alone bids us curtail our extracts. However, the above are some of the natural-history touches, which are mixed up with dryer descriptive portions of this work. So abundantly are these observations interspersed, that there is scarcely one of the genera or species with regard to which the author has not some valuable notes to give, derived from personal observation.

The new edition of Mr. Smith's 'British Bees' bears evidence of careful revision; much that is new has been added, and some corrections appear. It is now 8vo in size, while formerly it was 12mo. The ten plates have all been revised, some of the figures re-drawn, others touched up, and one error corrected, *viz.* pl. vi., fig. 5, in first edition, was really the tongue of *Sphecodes gibbus* in miniature; now it is re-drawn and corrected, representing that of *Prosopis signata*. These plates are very beautifully and correctly drawn, the whole being the work of the author, who is both artist and engraver in this case. The synonymy is brought up to the present time; much revision has been done in it; its arrangement is better, being in chronological order. One of the most important new features is that the geographical distribution and number, or approximate number, of known species in each genus is given. Ten new British species have been added in this volume, whilst two formerly believed to have been British have been omitted: this leaves the number of bees enumerated as members of the British fauna at two hundred and eleven. It is our duty to point out one or two inaccuracies in botanical nomenclature.

We need only add that to the student of the *Aculeate Hymenoptera* this book is invaluable; yet it is so plainly written that the beginner may readily identify his species, and learn how, when, and where, to take the "British Bees."—J. T. C.

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[No. 167.]

LEPIDOPTERA EASILY OVERLOOKED.

No. I.—EBULEA STACHYDALIS.



EBULEA STACHYDALIS.



EBULEA SAMBUCALIS.

It is my intention occasionally to figure in the 'Entomologist' examples of moths likely to be overlooked on account of their resemblance to some nearly-allied and common species, and to point out the differential characters. To this I hope to add such hints upon the habits of the species under consideration as may lead to its more frequent observation in Britain. There can be little doubt that if their appearance and habits were better understood, many of our rare *Lepidoptera* would be more frequently observed.

As, in the summary of *Micro-Lepidoptera*, there is occasion to mention (Entom. x. 91) the addition to the Fauna of Britain of *Ebulea stachydalis*, by the acute observation of Mr. C. G. Barrett, who found it near Pembroke, I cannot do better than represent this species, and by its side, for the convenience of comparison, its commoner relative, *E. sambucalis*.

Ebulea stachydalis, although very closely allied to *E. sambucalis*, is usually smaller, and of a darker appearance. The wings are broader and shorter, with a more strongly waved hind margin, and the apex of the anterior wings more acute than in the latter species. *E. stachydalis* has

only two, instead of three, yellowish spots on the anterior wings; this being a constant and certain character. These spots are smaller, and the wing has less of the yellow dusting, the absence of which gives it the darker shade of colour. Another notable difference is that the male of *E. stachydalis* has on the under side of the antennæ exceedingly fine, but distinct, down: to see this requires a magnifying lens. In the male of *E. sambucalis* this down is absent, but replaced by fine dentations.

If, during the middle of June, we examine, or beat in the neighbourhood of beds of the unpleasant smelling woundwort (*Stachys sylvatica*, *S. palustris*, or *S. arvensis*), we shall probably find the imago of *E. stachydalis*. These plants are usually common, and very generally distributed over Britain, as their names signify, in woods or hedgerows, boggy places, and cornfields, respectively. The two former are the most likely to produce this moth; in fact, Mr. Buckler has found the larva on *S. sylvatica* (Entom. x. 91). A further acquaintance with *E. stachydalis* induces Mr. Barrett to say that "when alive it is *not* strikingly like *Sambucalis*, but from its shorter, squarer fore wings, its darker colour, and square discal spot, is actually far more likely to be mistaken, when flying, for *Scopula olivalis*" (E. M. M. xii. 158). It is sluggish and reserved in its habits, "fluttering close among its food-plant when disturbed."

The larvæ may be found early in September, feeding in folded leaves of *Stachys*, forming "a sort of tube," while the larvæ of *E. sambucalis* feed about the same time on the under side of elder leaves (*Sambucus nigra*), protected by a whitish silken web. Several of our correspondents have found occasional specimens amongst their *E. sambucalis*, where they have been placed as dark varieties. The specimens, from which the accompanying descriptions and figures are taken, have been kindly lent by Mr. Bond.

We shall be pleased to hear from correspondents who have captured this species, as a knowledge of its geographical distribution in this country will be interesting.

JOHN T. CARRINGTON.

Royal Aquarium, Westminster,
March, 1877.

PHYTOPTUS OF THE BIRCH-KNOTS.

By E. A. ORMEROD.

AMONGST the various forms of galls caused by *Phytopti* the peculiar growth of twigs in the birch tree (commonly known as witch-knots) is of some interest, from the attack of the gall-mites producing an increased development of woody growth from the infested buds, instead of—as is usually the case—leaf-galls, or diseased leaf-buds alone.

As far as I am aware attention has not yet been drawn to this point. Dr. F. Löw, in his notice of the *Phytoptus* galls of the *Populus tremula* (Verh. der z.-b. Gesellschaft, Wien, xxiv.), mentions the shortened twigs bearing the leaves in unnaturally close proximity, which in some degree corresponds with one stage of the birch growths, but he does not allude to any increased development of the twigs; and in the 'Pflanzen-feinde' of Kaltenbach, beyond an allusion to these growths, there is no instance given of woody growths under the head of *Phytoptus*.

Dr. J. W. H. Trail, in his papers on Scottish galls, mentions finding multitudes of *Phytopti* on the *Betula alba* (Scot. Nat. iv. 17); but in this case they were observable amongst the patches of vesicles growing in depressions of the leaves.

The witch-knot, or great bunch of twigs looking like a large bird's nest fallen at random amongst the branches of the birch, is familiar to all; and having noticed some of these on birches planted by the road-side in the neighbourhood of Isleworth (Middlesex), an examination of the trees showed them to be suffering so much from the attack of the gall-mite as to allow of its effects being traced from the commencement. The affected buds are distinguishable by their swollen form,—after a time by the knotted clusters into which they are thrown by the diseased development of great numbers of them close together; and in November the four-footed *Acarus* (*Phytoptus*) is to be found in an active state amongst the inner scales,—in considerable numbers, certainly, but still to be counted rather by dozens or scores, than by the hundreds or innumerable quantities noticed in some other cases of *Phytoptus* bud-possession. The infested buds may be distinguished by their spheroidal shape, greater size, and

loosely imbricated irregular scales (as shown magnified, fig. 1), from the natural growths, which are smooth and lanceolate in general outline. A few months later (about the beginning of February) a touch to one of these distorted buds will often throw off all the diseased scales, and at their bases the coming growth will be found in the numerous minute round buds set close together on the common thickened centre, as shown, magnified, at fig. 2. The growth of the knot from these embryo buds is the work of years; but whilst the tree is still bare of leaves it may be found in every stage of progress: the shortened shoot beset with swollen buds, as (magnified) at fig. 3; the compound form, where many buds have grown close together so as to present a hard cluster,



Fig. 1

L2



Fig. 2

L2



Fig. 3

L2

with a few shoots starting from it, fig. 4; and so onwards, till the witch-knot is fully formed, a mass sometimes more than a yard in diameter.

The *Phytoptus* causing the diseased growth is grayish white, cylindrical, and rarely exceeding one two-hundredth of an inch in length, and a quarter of that measure at its greatest width; but its powers of elongation and contraction make it difficult to give more than an approximate measurement. From the insertion of the legs to the caudal foot the *Phytoptus* is marked with transverse striæ of such minuteness as to give about a hundred to the length of the body, these in the early life of the gall-mite being deeply corrugated; when full grown the bands are marked with dots, about thirty-two to the circumference of the mite, having a projection, when seen against the light, as if possibly composed of a pencil of short hairs. The legs, at full stretch, only extend about half their length beyond the head, and when in motion the

difference in form between the species of sucker-foot and the neighbouring bristle appendages is clearly visible. In the act of walking the terminal portions of the leg are pressed down so as to be almost at right angles with the parts above, and the sucker-foot may be seen with a small enlargement at the extremity while free; when the leg is drawn forward in the act of being raised the appendage may be seen curved backwards as if still adherent, and then loosened and withdrawn with a sudden jerk.

Fig. 6 represents the *Phytoptus* much magnified, but still, from the exceeding minuteness of the mite, gives only a



general idea of its structure. The chief peculiarity in the appearance of this species, compared to the figures which I have had the opportunity of examining, is in the greatest width being immediately behind the insertion of the legs, instead of further back, so that the somewhat sudden tapering to the head gives it a more angular form. The caudal extremity is distinctly lobed, and capable of being curved downwards, and of free use as a caudal foot of sufficient power for the gall-mite to raise itself on it completely free of other support. On each side of this caudal foot is a stout bristle, and at a short distance a smaller pair is set on the upper part of the back. Three other pairs are placed—one just behind the insertion of the legs, the others at short distances from them along the sides of the body. These hairs appear, excepting in the case of the caudal bristles, to be frequently deciduous after death;

but whether from their absence, or from not having a sufficiently powerful object-glass to discover them, I was unable to see more than these five pairs of bristles on or under the body. The corrugated furrows beneath, behind the insertion of each pair of legs and of the head, with their longitudinal lobes, and the movement of the mouth, as the mite moved it on the surface of the slide, were clearly discernible.

About the beginning of February I found numerous egg-like bodies amongst the diseased leaf-scales, from which *Phytopti* were shortly after disclosed, occasionally perishing whilst partly excluded from the pellicle, so as to give ample opportunity for examination. These eggs, or egg-like bodies, were bluntly ovate (as in fig. 5, magnified), much produced and lobed at one end, in a way that would correspond with the caudal extremity of the contained *Acarus*. The pellicle was similarly transversely striated, and before the exclusion of the contained gall-mite was dragged out of all resemblance to the form of an egg, and left sometimes with the markings at the two extremities, having much the appearance of a cast skin, except in the absence of limbs and appendages.

The *Phytoptus*, on exclusion, was fully half the size of the full-grown specimens; and from the relative measure of the egg-like mass, and the full-grown *Phytopti*, the change of skin seems to be the more probable hypothesis than original hatching. Here, however, more observation will probably make all clear as the season proceeds.

Ipsleworth, Middlesex, Feb. 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 70.)

63. *Neuroterus lenticularis*, Ol. (*N. Malpighii*, H.).—The honour of having satisfactorily distinguished the flies which produce the lenticular galls is due to Von Schlechtendal, but the distinction of the galls themselves still leaves room for improvement; the three species which most resemble one another are *N. lenticularis*, Ol. (*N. Malpighii*, Hart), *N.*

læviusculus, Schenck (*N. pezizæformis*, Schl.), and *N. fumipennis*, Hart. (*Spathegaster varius*, Schenck). The galls of *N. lenticularis* seem to occur on *Q. sessiliflora*, *pedunculata*, and *pubescens* (this, however, requires confirmation, as



Fig. 63.—NEUROTERUS LENTICULARIS.

formerly the three above-mentioned species may have been taken for one another): they appear in the middle of summer on the under side of the leaf, but do not grow through: the gall at first consists of a flat disk, closely adhering to the leaf, but only attached in the centre, and reaches a diameter of six millimetres; it is yellow or red, and covered with rather long brown stellated hair; it becomes gradually raised in the centre; the under side is nearly flat, with white spots near the margin, and more scantily covered with hairs. The galls fall in October, and pass the winter on the ground, leaving only a spot on the leaf as a trace of their former presence: whilst there they swell lentiform, lose many of their hairs, and remain in a sappy state till the gall-makers, which are developed in the centre of the gall without an inner gall, appear in the first half of the month of March. After the above description it need hardly be said that the gall-makers can only be bred unless they, like all deciduous galls, are placed on damp sand, or are not collected from under the oaks till February.—G. L. MAYR.

This is by far the most abundant of the three closely-allied species of *Linsengallen*. It will be found, I believe, to be almost ubiquitous in Britain, and where it does occur it is everywhere gregarious (if that can be said of a gall); the most

northern recorded locality I know of is that of Aberdeen, by Dr. Traill, in the 'Scottish Naturalist.' There is an interesting account of the different aspects of, and life in, these galls, by the late Mr. F. Walker, in the 'Entomologist' (vi. 304), and the following unpublished note relating to parasitism is from the same pen:—"About 600 females, but not one male, appeared in March, 1874, from galls which I had collected in the preceding winter; they were followed in April by about sixty of *Synergus Tscheki*, so that the latter was to the former in the proportion of about one to ten; then came a few examples of a *Eurytoma* and a *Callimome*, whose specific names may be deferred." *Tscheki* is the only *Synergus* mentioned by Mayr as in any way related to these galls; he says:—"In a hot room I obtained a specimen as early as the 28th of December, and two specimens of the gall-maker on the 4th of January." I have bred it as late as June 28th. The *Eurytoma* has elsewhere been given the specific name *signata*, but that is a name which I am afraid "shall seem to signify." Of the *Torymidæ* Dr. Mayr, in his Essay, gives three species bred from these galls, two of which are new species described by him, both peculiar to the spangle galls, both received from Schlechtendal, and both bred in the spring of the succeeding year; their names are *C. hibernans* and *C. sodalis*. *Hibernans*, which differs from *sodalis* in having a rather shorter ovipositor, was also bred by himself; both species are closely allied to the common *C. auratus*, Fonsc., which may be bred from these galls, according to Taschenberg. It is difficult to say which species Walker's specimens may be referred to; however, in the 'Cistula Entomologica,' where Walker gives a *resumé* of Mayr's monograph, he says—"I have reared *Syntomaspis fastuosus* (Boh.) from these spangles." Mayr himself received seven Saxony bred females of *S. caudata*, Nees, from Von Schlechtendal, but as Walker had just studied the monograph before giving the above information it is only fair to suppose that both species have a *penchant* for *Lenticularis* larvæ. Speaking of *Eutedon flavomaculatus*, Ratzeburg says, "Herr Tischbein obtained it from *Cynips Malpighii*," but I think it is probable that it was parasitic on some leaf-miner, either *Orchestes* or *Lithocolletis*, being a known inhabitant of the mines of both the Coleopterous and Lepidopterous genera.

The same author speaks of *Megastigmus Bohemanni* (i. e., *dorsalis*, Fabr.) as a parasite—this also on the authority of Tischbein—but it needs confirmation. On the 20th and 22nd April, 1875, I bred two parasites from these galls, which cannot be referred to any of the above; they belong, I believe, to one of the numerous genera of *Pteromalidæ*, but I have as yet been unable to identify them. *Pleurotropis sosarmus* may be bred from these galls in some numbers from the end of April to May, as well as from *N. numismatis*.*—E. A. FITCH.

NEW AND RARE MICRO-LEPIDOPTERA OBSERVED DURING THE YEARS 1874, 1875, 1876.

By WALTER P. WESTON.

PYRALIDES.

Odontia dentalis, W. V.—Occurred freely at Folkestone among viper's bugloss (*Echium vulgare*). The more inaccessible the place where the bugloss grows, the greater the chance of finding *Dentalis*.

Aglossa pinguinalis, Linn., var. *Streathfieldii*, Curt.—A specimen of this rare variety was taken on August 18th, 1875, by Mr. C. A. Briggs, in an empty room in a house at Teddington.

A. cuprealis, Hub.—Dr. Battershell Gill had the good fortune to find this species in an old flour-mill near Cambridge. Mr. Thurnall also records it from Whittlesford, in the same county.

Pyrausta punicealis, W. V.—The Rev. J. Hellins (E. M. M. xi. 66) records the breeding of this species from larvæ feeding on catmint (*Nepeta cataria*). He gives a full description of the larva and of its mode of feeding.

Agrotera nemoralis, Scop.—Occurred in East Sussex in great abundance. Mr. W. H. Tugwell records its capture

* Mr. G. B. Rothera's record is as follows:—March 6th, 1874, one hundred and eight *Neuroterus lenticularis*; 7th, one hundred and sixty-four and one hundred and twenty-two *N. lenticularis*; 28th, two *Callimome* (? male and female). April 9th, one *Callimome* (? female); 12th, one *Callimome* (? female). May 4th, twenty-nine *Pleurotropis sosarmus*; 10th, fifty-six *P. sosarmus*. The *Torymidæ* specimens may be *C. hybernans*, Mayr; but they were difficult to determine with any certainty. There is again an absence of *Synergi*.—E. A. F.

there in the 'Entomologist' for 1874, and also gives an account of its life-history (Entom. ix. 179). Its capture is also mentioned from the Blean Woods, near Herne. Mr. S. Stevens, at a meeting of the London Entomological Society, exhibited specimens taken in Abbot's Wood, Lewes.

Diasemia literalis, Scop.—On May 2nd, 1876, Mr. C. G. Barrett found a new locality in South Wales for this rarity, where he succeeded in taking a tolerable quantity. Though not generally known, it also occurs in Hampshire, between Winchester and Southampton.

Nascia ciliatis, Hüb.—Occurred again in the fens, a single specimen being taken at light in 1876, by Mr. E. G. Meek.

Cataclysta lemnalis, Linn.—Mr. W. Buckler (E. M. M. xii. 102) gives a most interesting and detailed history of the earlier stages of this species. By long and careful examination of the specimens under his notice, he has been enabled to record with the greatest minuteness not only the earlier habits of an insect whose larval history has been hitherto veiled in obscurity, but also a parasitic disease to which the larvæ appear to be subject.

Paraponyx stratiotalis, Linn.—Following up his researches, Mr. Buckler also (E. M. M. xii. 160) describes the larva of this species. He notices the differences in the habits of each of the larvæ under his observation, and specially remarks a peculiar habit of theirs, which consists of a vigorous waving motion of the whole body, except the last three segments, at intervals of from one to three minutes. He says, "That this energetic undulation is connected with the respiration of the larva is evident from the fact that the branchial filaments are then all in strong action, for, instead of radiating as they do in repose, they become depressed a little, and point forwards in the direction of the head."

Hydrocampa nymphæalis, Linn.—Mr. Buckler also (E. M. M. xii. 210) publishes the life-history of this insect. The larva feeds on broad-leaved pond-weed (*Potamogeton natans*), generally keeping its case beneath the leaf, while it eats away the lower cuticle. As it gets full fed it seems to grow bolder, and feeds in a more exposed position.

Acentropus niceus, Oliv.—Mr. Platt Barrett notices its appearance in abundance at Sheerness, in August, 1875, at a locality where it was scarce the previous year. There were

hundreds dead on the water, and numbers clinging to weeds and blades of grass, or hiding under stones near the water's edge. The life-history is given in E. M. M. xii. 257. Mr. Dunning has also contributed a very valuable paper on the nomenclature of this insect to the Entomological Society.

Botys nubilalis, Hub. = *B. lupulinalis*, Gn.—Mr. C. G. Barrett records the capture in July, 1874, of an insect which was unknown to him, on a window in the south of London. On forwarding it to Professor Zeller, he returned it as this species. Mr. Barrett's specimen is of a pale fuscous, a form not uncommon on the Continent; and his capture adds another to the few instances of the occurrence of this species in this country.

B. lancealis, W. V.—We are again indebted to Mr. W. Buckler for a description of the larva of this insect. He gives a detailed account of its habits in vol. xii. of E. M. M. The larva feeds in a web amongst the leaves of hemp-agrimony (*Eupatorium cannabinum*) in August and September. When full fed it spins a cocoon, within which it hibernates and changes to a pupa early in the following May; and the moth emerges at the end of the same month, or beginning of June.

B. terrealis, Tr.—Mr. J. B. Hodgkinson records having bred this species in 1874, from larvæ feeding on golden-rod (*Solidago virgaurea*), in the previous September. Mr. G. T. Porritt also gives a description of the larva in this magazine for last year.

EBULEA STACHYDALIS, *Zinc*.

PARIETARIALIS, *Mann*.

This interesting species was added to the British fauna in June, 1875, by Mr. C. G. Barrett, who discovered it in the neighbourhood of Pembroke. Mr. Barrett has since taken several specimens; and the species is fully described, and its synonymic history given by him (E. M. M. xii. 158). Subsequently Mr. Bond, at a meeting of the Entomological Society in April, 1876, exhibited a specimen taken by himself at Kingsbury, Middlesex, in June, 1862. Mr. Buckler likewise gives a good description of the larva (E. M. M. xiii. 133).

Pionea extimalis, Scop. = *P. margaritalis*, Fab., W. V.—A specimen is recorded by Mr. Pratt, from his garden at

Mile End: a strange locality, unless gardens there are given up to the growth of ill weeds and rank vegetation.

Spilodes pascalis, W. V.—This formerly rare species has been taken in some plenty in late years. It is commonest at Folkestone, where numbers have been taken and bred from larvæ feeding in the seed-heads of wild carrot (*Daucus carota*). Mr. Hodgson also records having found it numerous at Sheerness. Mr. C. W. Simmons bred it in 1875, from Dartford, where the larva was common in 1874, though only occurring there sparingly the previous year or two. Its capture is also noticed from the railway slope, near New Cross; at Manchester; and on the banks of the Mersey, near Liverpool. Dr. Gill took two specimens in Norfolk; and a few have occurred in North Kent.

Scopula decrepitalis, Herr.-Sch.—The Rev. W. Hambrough mentions the occurrence of three specimens in May, 1876, in the Trosachs, Scotland, amongst a profusion of whortleberry (*Vaccinium vitis-idaea*).

Lemiodes pulveralis, Hub.—Dr. Knaggs records the reappearance of this rarity at Folkestone, in 1874. The year following about a dozen occurred there amongst rank herbage; and in 1876 it was taken in some plenty.

Mecyna polygonalis, Hub.—A single specimen is recorded from the same favoured locality, in 1875, by Mr. Haggard.

Scoparia scotica, White.—Must, I fear, stand only as a variety of *S. cembra*. Even its sponsor is, I think, now of this opinion.

S. ingrattella, Zell.—Mr. W. Machin has reared this species from larvæ in the roots of sorrel, collected at Folkestone, in April, 1874.

1, Duncan Terrace, N., March, 1877.

ON MELANISM IN LEPIDOPTERA.*

By NICHOLAS COOKE.

Mr. Birchall and Dr. Buchanan White have recently given us some of their ideas with regard to melanism in *Lepidoptera*, which appear to me far from satisfactory.

* Read before the Lancashire and Cheshire Entomological Society, at a meeting held at the President's house in February, 1877.

Both are of opinion that "natural selection" solves a great part of the difficulty there is in arriving at knowledge of the cause of melanism. I cannot understand, for my own part, what natural selection has to do with it. I boldly deny there is any such influence at work amongst either *Sphingidæ*, *Bombycidæ*, *Geometræ*, or *Noctuæ*. The *Diurni* which do not pair soon after they emerge from the pupa may, to some degree, select their mates; but the other classes above named, as far as I have observed, pair without any selection whatever. The female, as soon as she is mature, and sometimes before maturity, exercises an irresistible influence over the males, which, as soon as perceived by them, brings them in search of the object of attraction; and the first male which reaches the female, no matter if a cripple, is allowed by the female to pair with her. I have seen *Notodonta trepida*, in Delamere Forest, paired before the female was fully developed. Was there any selection there? Mr. Greasley and I, when hunting for *Cheimatobia boreata* last November, in the above locality, repeatedly found females of *C. boreata* paired with miserable little males, whilst a dozen or more far better developed males were hanging to the twigs in the vicinity, having evidently arrived too late.

I could multiply the evidence on this point, but I feel sure that every one of experience will grant that natural selection does not exercise any influence in causing melanism in most classes of *Lepidoptera*. I wrote to Mr. Birchall with regard to this point, and he admitted that "sexual selection" did not appear to have so much to do with melanism as the "survival of the fittest" larvæ. I grant that the fittest larvæ survive—and what is the consequence? We find the fittest larvæ of certain species here produce a darker variety than the fittest larvæ in another locality, and *vice versâ*; other species are here produced of a lighter variety than in the other locality; for instance, we take *Hadena adusta* here in abundance, but they are all light-coloured; in Glen Spean this species occurs in profusion, but no light varieties can be met with. In this neighbourhood we take *Acronycta leporina* of a tolerably deep gray colour; at Loch Laggan it is beautifully white, with the characteristic marks dark. Here, we have *Pieris napi* white; at Roy Bridge, Inverness-shire, I took several very dark ones: all I saw were dark, and I

have one nearly suffused with black. *Plusia festucae* is here of a rich dark colour; in Glen Spean it is much lighter; and I could go on enumerating these differences in coloration, but I have instanced enough for my purpose. Neither sexual selection nor the survival of the fittest larvæ account for melanic variation. We must look for other causes.

The most interesting case of melanism that has come under my observation—and my friend Mr. N. Greening, of Warrington, can say if I exaggerate the facts—is the total change in the colour of *Tephrosia biundularia*, in Delamere Forest. Some thirty years since, when he and I visited Petty Pool Wood, this species was very abundant, appearing in March, and was to be found through April and May, but all were of a creamy white ground colour; dark varieties were so scarce that they were considered a great prize. Now, it is just the reverse; all are dark, smoky brown, approaching black; a light variety is very rare. The same change, and nearly to the same extent as regards numbers, has come over *Amphidasis betularia* throughout the district, from Petty Pool, including Warrington, to Manchester; the black form is now usually found. I am inclined to suspect that climate and manufactures have done more to bring about this change than anything else. During the past thirty years what large towns have sprung up to the west of this district! Runcorn, Widnes, St. Helens, Earlstown, Wigan, &c., all pouring forth from their tall chimneys chemical fumes and coal smoke, which emanations are carried over our collecting grounds by every westerly wind; and the wind is westerly for nine months out of the twelve. This may have effected a change in the climate, as well as deposited on the leaves of trees and food-plants of *Lepidoptera* matter which may possibly cause some white insects to become gradually black, through being swallowed by the larvæ along with their food.

Electricity may have something to do with causing curious varieties occasionally, but I question very much its having any influence in creating such a change as that which has taken place in the colour of *T. biundularia*. It is also likely, I think, that geological formation influences colour in insects; for we find species on chalk and limestone of light colour, and dark species more prevalent on other formations; but there does not seem to be any law even here, for the

same formation produces white butterflies and black moths: for instance, *Pieris brassicæ* and *Mania maura* occur in the same locality. However, geological formation may have more to do with the existence of permanent varieties or evolution than we at present think.

I have before me some closely-allied species, with their anal appendages denuded, in order to compare the difference of structure in different species, and in varieties of the same species. There is very little, if any, difference between the anal appendages of *Acronycta psi* and *A. tridens*, yet the larvæ are very distinct. The sexual organs of *Cerastis vaccinii* differ little from those of *C. spadicea*, but how far their larvæ differ I do not know from experience. I find a slight difference between *Epunda lutulenta* and its variety *Luniburgensis*, but a very marked difference between these varieties and *E. nigra*; also a great difference between *Tephrosia biundularia* and *T. crepuscularia*, as well as between the varieties of *Triphæna orbona* and *T. fimbria*. On comparing the anal appendages of a male *Crymodes exulis* from Iceland with another from Inverness-shire, I found them identical; until then I believed them to be distinct species. When we discover the larvæ of this species in Scotland we shall then be able to determine whether ours is a mere variety of *C. exulis* or not; but at present I still think it doubtful, because I find the anal appendages of closely-allied species in some cases identical; and I am certain that the *Hadena assimilis* of Doubleday has different habits in Scotland from those of *C. exulis* in Iceland.

If the doctrine of evolution is a true theory, then these varieties are most interesting: they appear to me to be carrying into effect the laws of Creation before our eyes. It is just as easy for the Creator to say, "Let there be a man, and there was a man," as to say, "Let there be light, and there was light;" but if the latter was the way in which man sprang into existence, how comes there to be such a race as ours, and another so different as the negro race? Darwin justly remarks, when speaking of races of men:—"Some of these, such as the negro and European, are so distinct, that if specimens had been brought to a naturalist without any further information, they would undoubtedly have been considered by him as good and true species." So with varieties

of *Lepidoptera*, if evolution is a fact: these differences which so puzzle us are changes going on which will in time cause certain forms, which we now call varieties, to rank as distinct species. Though it is a grand display of creative power to say, "Let there be this species and that species," and they exist, may it not be equally a manifestation of Omnipotence to imagine progressive development producing all the variety of animal life, and so executing the law and design of Almighty wisdom and power.

Gorsey Hey, Liscard, Feb. 12, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

FURTHER NOTES ON *LYCÆNA ARION*.—With reference to the notes of Mr. J. Brown (Entom. ix. 204) and Mr. G. F. Mathew (Entom. x. 35) I have noticed that many Lepidopterists appear to be in doubt as to the exact time of the year during which *Lycæna Arion* is on the wing in this country. Several authorities give July; but I should say that the time at which it may be met with in the greatest perfection is from the second to the fourth week in June. It was on the 26th of June last, in an unfrequented part of the West of England, that I first had the pleasure of seeing this lovely species alive. In the locality flowers were abundant, especially wild thyme; and before I had been on the ground ten minutes I saw several specimens of *Lycæna Arion*. In the course of three hours I netted about thirty-eight specimens, nine of which were so chipped and worn that I set them at liberty. On the following day I again visited the locality in which I had found *Arion* on the previous day, and in the course of an hour and a half I netted about a couple of dozen specimens, of which I only kept fourteen. Possessing that "wholesome dread of exterminating species," I refrained from visiting the same locality on the 28th, and went instead to a new neighbourhood, some fifteen miles further west, where it was rumoured that *Arion* had been taken many years ago. In this locality I did not see a single specimen of *Lycæna Arion*; but *L. Alsus*, *L. Adonis*, and *L. Agestis*, were all common, as was also *Acidalia ornata*. The spring of last year was very cold, and the season, prior to July, was

certainly not forward, yet out of sixty-six specimens of *Lycæna Arion* netted by me on the 26th and 27th of June, only forty-six, or little more than two-thirds, were in fine, or even fair, condition. Such being the average condition of the species on the 26th and 27th of June in a backward season, I think one may fairly assume that the last stragglers must have been *passé* before the middle of July; and I am not surprised, therefore, that Mr. Brown "only took one specimen" on the 17th of July, and that Mr. G. F. Mathew found many specimens worn on the 7th of July. *Lycæna Arion* is undoubtedly a very local species in this country; but I fancy that when the whole of the south-western and western counties have been thoroughly explored, we shall hear of its occurrence in several hitherto unrecorded localities.—H. Goss; The Avenue, Surbiton Hill, Surrey, Feb. 1877.

IDENTITY OF PAPILIO XUTHUS WITH P. XUTHULUS.—During my four years' residence in Japan both my friend Mr. H. Pryer and I were at a loss to account for *P. Xuthulus* having only one brood, whereas all the other Japanese *Papilios* had three or more. We determined to investigate the subject. In the spring of 1875, on the appearance of *P. Xuthulus*, we watched the females depositing their eggs, from which in the month of June we reared *P. Xuthus* (the large dark form). In September of the same year we obtained batches of eggs from *P. Xuthus*, which in the spring of 1876 produced *P. Xuthulus* (the small light form). These facts should be sufficient to convince even the most sceptical on the subject.—F. M. JONAS; 51 & 52, Fenchurch Street.

DESCRIPTION OF THE LARVA OF EPHYRA ORBICULARIA.—On the 29th of July last I received, through the kindness of Mr. J. G. Ross, of Bathampton, a dozen full-grown larvæ of this species. Length about an inch, and of moderate bulk in proportion; the head has the lobes rounded, is slightly notched on the crown, and is the same width as the 2nd, but narrower than the 3rd, segment. Body cylindrical, and of nearly uniform width throughout, the front and last three posterior segments, however, being slightly narrower than the middle ones; the segmental divisions are well defined, and the skin has a somewhat tough appearance. Ground colour of the dorsal surface bright apple-green; head pale brown, very prettily reticulated and spotted with dark brown,

and two stripes of the paler brown colour running through each lobe are very conspicuous; a pale grayish line, finely edged with dark green, forms the dorsal stripe; the subdorsal lines are of the same colour, but waved throughout their entire length; the whole of the spiracular region, including the space between the subdorsal and ventral regions, is in some specimens entirely white, but in others is very delicately and beautifully marked at regular intervals throughout the entire length, with blotches of pink or bright pale purple. On each side of the 5th, 6th, 7th, 8th, and 9th segments, is an oblique smoky mark, each mark commencing on the front of the segment, and extending backwards into the pale spiracular area; the usual dots and spiracles are distinct, black. The ventral surface is green, with five longitudinal white stripes,—a central one, and two on each side outside it; the usual dots distinct here, too, and also black; the prolegs tipped with pink. Feeds on willow; and when full fed, like others in the genus, affixes itself to a leaf by the anal claspers, and spins a band or belt round the middle of the body, exactly in the same manner as the *Pieridæ* amongst the butterflies. The pupa varies from half to three-quarters of an inch in length, and is of the usual *Ephyra* shape and position. Head square and blunt, and from it the body is attenuated gradually and evenly to the anal point; the front and back are rounded, but are distinctly divided by a lateral ridge, which extends a little beyond the head on each side, forming two short blunt points; the back is also slightly arched. Ground colour of the pupa grayish white, with the leg- and wing-cases veined with smoke-colour; there is a pale gray longitudinal line through the centre of the back, and on each side of it a series of black dots. Two imagoes emerged about the middle of August; the remainder of the pupæ stand over until spring.—GEO. T. PORRITT; Highroyd House, Huddersfield.

FOOD OF *LOBOPHORA VIRETATA*.—I am enabled to add two others to the published list of food-plants of *Lobophora viretata*: they are *Rhamnus frangula* (alder buckthorn) and *Fiburnum opulus* (guelder-rose). Those recorded are *Ligustrum vulgare* (privet), *Acer Pseudo-platanus* (sycamore), and *Hedera Helix* (ivy).—G. C. BIGNELL; Stonehouse, Plymouth.

HYDRILLA PALUSTRIS.—In 1864 I had the pleasure of exhibiting to the Entomological Society a specimen of *Hydrilla palustris*, captured in 1862 by Mr. Scholfield, in Quy Fen, Cambridgeshire. (See Proc. Ent. Soc., 1864, p. 20; and Ent. Mo. Mag. vi. 218.) In the Supplement to Henry Doubleday's 'Synonomic List of British Lepidoptera,' published in 1865, the name was removed from the "Reputed British Species," and took its place in the List. In 1869 Mr. Barrett captured a male specimen near Norwich. (See Entom. iii. 252; Ent. Ann., 1870, p. 124.) On recently perusing a number of letters, written by the late Henry Doubleday, I found the following, dated Epping, 7th August, 1870:—"English's boy brought me a few *Lepidoptera*, which he took near Cambridge, and among them is a fine male *Hydrilla palustris*, a species of which I did not before possess a British specimen." I cannot find that this capture was ever published. The specimen may be seen in the Doubleday Collection at the Bethnal Green Museum.—J. W. DUNNING; 24, Old Buildings, Lincoln's Inn, February 27, 1877.

HADENA SATURA.—A single specimen, in my collection, was taken by Mr. John Hancock, while it was at rest on the fencing of Brandling Place, Newcastle-on-Tyne, in the month of April, 1845. August is stated to be the usual time of appearance of this moth. This exceptional instance has, I believe, never been recorded.—V. R. PERKINS; Wootton-under-Edge, January, 1877.

HELIOTHIS SCUTOSA.—In the valuable list of scarce insects, contained in the last two numbers of the 'Entomologist,' the capture of *Heliothis scutosa* is noticed, and the question is asked whether anyone has confirmed the correctness of my identification. It may be of interest to know that a second specimen of *H. scutosa* was captured in the same Norfolk locality last year. This insect I have presented to Mr. C. G. Barrett (who confirms my nomenclature), as a mark of my gratitude to him for the most useful information I have derived from his "Norfolk Lepidoptera," whilst collecting in that county.—W. H. THORNTHWAITTE; 416, Strand, W.C., February 19, 1877.

TÆNIOCAMPA INSTABILIS.—What will the readers of the 'Entomologist' think when I state that I have visited the Sallows every spring for the past thirteen years, and during

that period have captured all the *Tæniocampa instabilis* I have seen, and have placed them *all* in my cabinet: the total number is three.—G. C. BIGNELL; Plymouth.

COLEOPHORIDÆ REARED IN 1876.—*Coleophora juncicollæ*, in its little brown case, is most easily procured by beating heather into an umbrella in spring, placing the *débris* in a bag until one gets home; then into hat-boxes, with gauze over. The larvæ will soon be detected crawling up for light and air.

C. pyrrhulipennella in the same way; but this is rather local, and can only be taken in quantity by a fortunate chance.

C. laricella: in the larch plantations, at Witherslack, I have seen every bud bleached by the ravages of the larvæ of this little moth; in turn they were being destroyed by large red ants, which were climbing about the branches until they found their prey, when they dropped headlong with it in safety to the ground.

C. albitarsella is rather common on the ledges of rocks on Whitbarrow, on wild marjoram, but will not feed on the marjorams grown in gardens, as I found to my cost when I bred them.

C. fuscocuprella has been taken this autumn in profusion in larval state on the nut bushes in Grange. It prefers a south or western aspect, and feeds principally on the little leaves at the termination of a bough. Like all other *Coleophoridae* it feeds underneath the leaf, and makes three or four brown spots, which at once discover its presence. The best time for collecting this larva is September and beginning of October.

There is on the peat at Witherslack a *Coleophora*, with its case similar to *C. viminetella*, feeding on *Myrica Gale*, but which will also feed on willow. It has never been bred separately, but it appears to be a more metallic insect than *C. viminetella*, when caught on the wing.—J. H. THRELFALL; 4, East Cliff, Preston, December, 1876.

LARVA OF ARGYRESTHIA ANDEREGGIELLA.—I have been in the habit of taking this beautiful little moth for twenty years amongst crab- or wild-apple trees (*Pyrus Malus*), but had utterly failed to find the larva, until by accident I found it at Windermere. Being tired one day in June I sat down out of the

sun under a large beech tree, and as I never think of having a nap when I should be working, from habit my eye was looking for something or anything. Eventually it rested on an old leafless crab tree, on which were some fine silken threads shining between me and the light at the end of the twigs. Up I got at once, saying to myself, "Now for *Andereggiella*." And so it was; for upon looking beneath the web I found, snugly ensconced where the pith should be, a fat larva. I further secured a dozen more larvæ. These left the web and made a pretty white cocoon on the box-lid. In a fortnight after I bred nine lovely specimens of *Argyresthia Andereggiella*.—J. B. HODGKINSON; Preston.

LAVERNA RASCHKIELLA.—I am not aware of any record that this species has occurred elsewhere than Box Hill, where I discovered it in 1856, as recorded in Stainton's 'Annual,' 1857. The larva is to be had plentifully in some of the woods here, mining the leaves of *Epilobium angustifolium*, which grows in great profusion. I have not seen its congener, *Laverna conturbatella*.—F. O. STANDISH; Cheltenham.

DORYPHORA DECEMLINEATA.—Her Majesty's Commissioners of Customs have received advice of the discovery of living examples of the Colorado potato-beetle at Bremen. They were found upon tubers imported from New York. Specimens have also been seen in other parts of Germany. The commissioners have consequently issued a circular to the various port collectors of customs in the United Kingdom, desiring that certain instructions already given be rigidly enforced, with respect to potatoes imported from Germany, with a view to prevent the introduction of this dreaded insect into Britain. It is undoubtedly quite right to take these precautions, and be, as far as possible, on the safe side; but I do not think that there need be much alarm or panic in this country with respect to the beetle, even if a few specimens should manage to get imported. Any large number is not likely to be introduced at the same time. The temperature and climatal conditions of England and Colorado are so *utterly* different, that I cannot imagine the creature would be likely to multiply to such an extent as to become a pest, though it is not improbable that stray specimens of it might get disseminated, and even keep up the breed. It is true that some foreign

Coleoptera have been imported and naturalised, and have occasionally multiplied to a sufficient extent to produce serious mischief; but these are chiefly *Cucujidæ*, *Bruchidæ*, *Dermestidæ*, *Plinidæ*, *Calandridæ*, &c., and their ravages are almost exclusively limited to granaries, hide or fur stores, and other places *under cover*. I am not aware of any *imported* Coleopterous insect having ever multiplied to the same degree when exposed to an *out-door* life, and the influences of our wet and variable climate; and the chief ravages of the *Doryphora* are committed upon the field crops during the growing season, not upon the stored produce.
—J. A. POWER.

REVIEW.

Economic Entomology. By ANDREW MURRAY, F.L.S.—
APTERA.—Prepared at the request of the Lords of the Committee of Council on Education. London: Chapman & Hall.

AMONGST the oldest inhabitants of the Bethnal Green Museum is the collection illustrative of Economic Entomology. When the branch museum shot out from its parent stem at South Kensington, this collection was among the first of the objects to travel eastwards; and, let us hope, has not proved the least attractive or least useful of its contents. To this was subsequently added types of the *Lepidoptera* taken within a radius of ten miles from Bethnal Green. These were presented by the Haggerston Entomological Society; and now the museum contains the far-famed Doubleday Collection of *Lepidoptera*. These, with a fine series of exotic *Coleoptera* and silk-producing insects, also removed from South Kensington, form quite an entomological feature in this industrial and educational institution.

In reviewing Mr. Murray's book it is necessary to draw attention to this economic collection. Few, indeed, in this country, are the exponents of Natural History in its applied or practical relations, compared with those of continental nations,—notably Germany and Sweden. The collection at Bethnal Green—that of Economic Botany from Kew, and other South Kensington collections—will, we hope, form the

basis on which to establish a technological museum, which may lead us to take greater interest in Economic Natural History. Even this collection, were it only made complete enough to clearly exhibit Technical Entomology (*i.e.*, so to arrange the life-history groups that they may be, in a sense, self-explanatory, requiring neither guide nor curator to connect the cause and effect), would do much to teach a percentage, at least, of what Mr. Carlyle is pleased to call the "thirty millions, mostly fools," to know and recognise their insect friends or foes.

To the general public these groups may, like many others, please and possibly instruct whilst they are under inspection; but the impression is very fleeting. To obviate this it is proposed to issue a series of handbooks on the various subjects, so that the good engendered may result in lasting benefit, if the interest is only excited sufficiently to ensure perusal. They are prepared, by order of the Lords of the Committee of Council on Education, by Mr. Andrew Murray, and are to serve as guides to the different branches of the collection, and as practical treatises on Economic Entomology.

This volume, the first which has appeared, treats of the *Aptera*. It is to be followed by the *Hemiptera*, the *Orthoptera*, &c., as set forth in the advertisement. We can but recommend this first part as treating of a class but little understood by British entomologists. The next part will probably give us a surer standard by which to gauge the value of the series.

The volume now under notice contains, after a brief notice of the woodlice, a collected history of the centipedes, scorpions, spiders, the various mites, ticks and lice, and the spring-tails (*Thysanura* and *Collembola*). These constitute the order *Aptera*, or wingless insects, as understood by Mr. Murray; and heterogeneous it is indeed. The mites come in for by far the greatest amount of attention, and are fairly well treated, thanks to the writings of Boisduval, Buckholz, Claparède, Dufour, Dugés, Dujardin, Frauenfeld, Fumouze, Furstenberg, Gervais, Giebel, Hering, Hermann, Kirchner, Koch, Kolenati, Laboulbène, Landois, Löw, Mégnin, Müller, Nicolet, Robin, Scheuten, Thomas, and some few others. This is opportune, as these creatures seem to be fast drawing into the field of general zoological research.

They have been much neglected in this country; but the volume now before us will serve to give a very general idea of their forms and habits. Their history, as expounded by the continental authors, has been very carefully collated by Mr. Murray; and the numerous figures illustrating these chapters will also make the determination of the now known forms a comparatively easy task. The lately published papers of Dr. Thomas, Dr. Kramer, Dr. Flögel, and M. Mégnin, contain further facts. The latter has given us, in addition to his other valuable contributions to Acarology, a most complete life-history of two species of the little scarlet *Trombidii*, from the egg, through the hexapod form to the octopod, and perfect state, illustrated by two admirable plates (Ann. Sc. Nat., 6th ser., Zoologie, iv. 4). The gall-making *Phytopti* are also worthy of further observation: one or two of their productions have engaged attention in Britain, but very little is known of the mites themselves.

We cannot find space to go further into the contents of the volume, but suffice it to say that it treats of many well-known and repulsive pests, giving information known to but few. It may interest some of our readers to know that "the simplest, easiest, and most effectual of all contrivances to destroy mites in cabinets, is to expose a few crystals of pure naphthaline for an hour or two in the drawers." As a handbook it cannot be expected to contain much new information or scientific discovery. Indeed, such pretensions are clearly disavowed in the Introduction; but as a *resumé* of published information it is very complete. With its four hundred and thirty-three pages, and four hundred and fifty-seven figures, it is well worth the outlay of three shillings, and deserves attentive perusal. Should it not add to the knowledge of the specialist, it will certainly do so to the general entomologist or zoologist, and cannot fail to instruct all readers.—E. A. F.

DEATH OF JAMES SCOTT BOWERBANK, F.R.S., LL.D.—It is with deep regret we have to record the death, on the 8th of March, at the advanced age of eighty years, of Dr. Bowerbank, whose name as an eminent naturalist and microscopist is familiar to all our readers. It is intended, if possible, to give a biographical notice and photograph in the May number of the 'Entomologist.'—ED.

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HELIOTHIS SCUTOSA.

By EDWARD A. FITCH.



HELIOTHIS SCUTOSA.

THE palpi are rather conspicuously porrected; the antennæ are simple in both sexes; the fore wings have the costal margin slightly arched, and are almost pointed at the tip; their colour is pale smoky gray, but indistinctly marbled with lighter and darker markings; the discoidal spots are very distinct, their median area is considerably darker than the ground colour of the wing, and they have a still darker circumscription; they are contained in a moderately well defined median band; there is a somewhat irregular but very distinct pale line almost parallel with the hind margin, on which is a series of seven compound black and gray dots; the wing-rays are distinctly pale; the hind wings are very pale gray, smoky at the base; with a broad marginal smoky band, which contains a pale blotch about the middle, divided by a dark wing-ray, and a smaller light spot is very faintly visible near the tip; there is also a dark gray, well defined discoidal spot, and a distinct narrow waved smoky line just before the marginal band, fringe pale; the head and thorax are gray, the body whitish gray. The species varies slightly in the intensity of its colouring and

in the marginal band of the hind wings; in one of my specimens this is scarcely darkened.

The caterpillar has been described by Treitschke and Freyer, and figured by Hübner. Although it is not uncommonly found, in some countries, on *Artemisia* in September, I am unable to find a detailed description, so translate Treitschke. The larva may generally be found in the autumn on the field mugwort (*Artemisia campestris*) at the time when this twiggy plant is on bloom; it is yellowish green, with the dorsal and subdorsal lines blackish; its whole surface is covered with small black dots and fine blackish streaks, with many black hairs proceeding from each dot, which form, as it were, small tufts; the head is reddish brown, spotted with black. It also varies to green at the sides, the ground colour being gray; these are divided by a white lateral stripe; it remains yellow above, otherwise like the ordinary form. It undergoes its transformation to the pupa state in a slight and loose cocoon either in the earth or amongst the debris of its food-plant. The pupa is slender, reddish-brown and greenish on the wing-cases.

The moth appears on the wing in May, June, July, August and September—all these months being given by different authorities consulted; whether it is double-brooded, or, like many of its congeners, uncertain as to its appearance, seems doubtful—probably only the latter, though Heinemann refers distinctly to the two broods. Professor Hering says—"very capricious in its appearance, rare in some years whilst in others very common." Thus the double-brooded theory has probably arisen from the uncertainty of its appearance in varied localities; but if it be true that the larvæ only feed on the flowers and seeds of mugwort, we can scarcely have more than one distinct brood, though the time of its duration in the pupa state may be variable, as we know to be the case with many other *Lepidoptera*.

On the Continent this species is very widely distributed, and is not rare, though Britain is probably its extreme northern limit in Europe. Dr. Staudinger, in the *Staudinger-Wecke 'Catalog'*, says:—"Europa centralis (exceptus Batavia et Belgica); Livonia; Gallia meridionalis; Pedemontium; Turcia septentrionalis; Rossia meridionalis; Altai Montes." Guenée says:—"Autriche, Hongrie, France méridionale,

Angleterre." Whilst Heinemann widens into—"Verbreitet bis Nord-deutschland, aber zerstreut."

As to its occurrence in Britain there is some doubt. It is figured by Curtis and Wood, included in Stephen's Museum Catalogue of British *Lepidoptera*, and described in Stainton's Manual; all on the authority of the Cumberland specimens; but in Doubleday's list it never got further than the 'Reputed British Species,' and in consequence was unnoticed in Newman's 'British Moths.'

In the 'Entomologist' for February, 1875 (Entom. viii. 42), Mr. J. B. Hodgkinson endeavoured to show cause against *Scutosa* being deleted from our lists, but with, I am afraid, but little if any immediate success; however, this species has lately been brought prominently forward by the news of its re-discovery in Norfolk, and the history of the four or five specimens taken in Cumberland, more than forty years ago, will now be read with increased interest. I have taken some trouble to learn more of these old, and, I believe, thoroughly genuine captures. Mr. Rothwell has supplied me with every information, and writes me that, "being a diligent collector of *Lepidoptera* when at school in Cumberland, I well remember taking many specimens which created quite a commotion amongst the collectors of Carlisle and the neighbourhood—Mr. Hodgkinson, sen., Mr. Heysham, Mr. Cooper, &c.; and doubtless the species you refer to (*Scutosa*) was one of them." He especially mentions the "Bee Sphinx (*Bombyliiformis*), the green Forester (*Statice*), and the Portland moth (*Præcox*)."

After some further correspondence Mr. Rothwell informed me that he had "turned up" three boxes of his old collection, and very kindly invited me to inspect them. This I did; and though neglected for upwards of forty years I found a by no means dilapidated collection, which contained a number of really good species, especially amongst the *Noctuæ*; but no *Scutosa*. This was disappointing; but the information elicited quite satisfied me of the authenticity of Mr. Hodgkinson's history, who, from his acquaintance and connections with the captors and localities, was fully justified in championing the British connections of this species. I showed Mr. Rothwell specimens of the moth, which he failed to recognise distinctly,—rather an expected

occurrence, considering the lapse of time; but he said, "It looks like one of the moths I used to take flying about the mugwort that grew so plentifully on the sandhills, about half a mile from the coast." This was circumstantial evidence, indeed, said as it was in ignorance of the species being a day flyer, and having no idea of the food-plant of its larva. The Cumberland locality, especially rich in entomological specimens as it was, has been overtaken by the march of improvement,—the port of Silloth now occupying the ground.

Though the larva is also said to feed on the common mugwort (*Artemisia vulgaris*), *A. campestris* appears to be its special pabulum. This plant has a very restricted range in Britain, being wholly confined to sandhills. Watson, in his 'Cybele Britannica,' only gives it as an inhabitant of one, and doubtfully of three, of the eighteen provinces into which Great Britain is there divided. Babington says—"Sandy heaths in Norfolk and Suffolk; rare." Hence of all districts we might expect these eastern counties to produce *Scutosa*, and it is from Norfolk that the capture of two specimens has lately been recorded by Mr. Thornthwaite (Entom. ix. 18; x. 99); and, as an entomologist so experienced as Mr. C. G. Barrett is satisfied with their *bond fides*, it is needless to remark further on these recent captures. Though the occurrence of *Scutosa* at light seems rather at variance with the known habits of the species, still the *Heliothidæ* is a most uncertain genus in many respects.

The figure is from a series in my collection, taken in Morocco by the late Mr. Trovey Blackmore.

Malden, April, 1877.

ON THE FORMATION OF A COLLECTION OF FOREIGN LEPIDOPTERA.

By W. F. KIRBY.

Author of 'A Manual of European Butterflies,' 'A Synonymic Catalogue of Diurnal Lepidoptera,' &c.

WHEN I first commenced the study of Entomology I began, as I suppose is the case with most beginners, by collecting insects of all orders, especially the larger and more striking species; but, after making the acquaintance of

several entomologists, I gradually devoted my attention to British *Lepidoptera* almost exclusively, not, in the first instance, from any special predilection, but because my friends neither cared for nor could give me any help with the other orders, nor could I obtain the books required to help me to work them out without other assistance. Having thus acquired an elementary acquaintance with British *Lepidoptera*, I removed to London, where, finding both collections and libraries within my reach, I determined to apply myself to the study of European *Lepidoptera*, then wholly neglected in England; and at the same time considerably extended my acquaintance with foreign *Lepidoptera* also. Since then I have had the entomological collection of the Royal Dublin Society (perhaps the third best public collection in the kingdom, those of the British Museum, in London, and the Hope Museum, at Oxford, being incontestibly the two first) under my charge for some years, which has added much to my experience. As it is not very easy for beginners commencing the study of European or Exotic *Lepidoptera* to acquire much practical information respecting them, in consequence of the want of good introductory books, and the very scattered form in which much of the literature of the subject is published, I thought that a few papers, pointing out the best means of forming a collection, the most useful books, &c., and giving a general account of the principal families of *Lepidoptera*, might not be uninteresting to some, at least, of the readers of the 'Entomologist.'

The *Lepidoptera* are so large an order, comprising at present at least 30,000 or 40,000 described species, that few can afford time, money, or cabinet room, to attempt to form a collection of the whole. Perhaps it is better to begin by collecting all that you have an opportunity of obtaining, until you have formed a preference for some particular group, and then to devote your attention exclusively to that; or, you may confine your attention to the productions of one particular country, either because you feel a special interest in it, or because you have opportunities of obtaining specimens from thence. Many British Lepidopterists form collections of Continental *Lepidoptera* for the purpose of comparison, and in this case it is of the utmost importance to obtain correctly-named types. Other entomologists may like to form a

collection containing representatives of the principal families or genera of the *Lepidoptera* of the world.

Many of the modes of collecting insects in use in England are equally efficacious abroad; but the most convenient way of collecting and bringing home a large number of specimens is by means of papers, which should be proportioned to the size of the insects they are to contain. These are prepared by folding a square piece of paper diagonally, and then doubling over one of the edges, leaving a sort of triangular envelope, open at the top. When the insect is dead (for only one should be put into each paper) the wings are pressed together over the back, and it is dropped into this envelope; the top is then folded down, and the papers can be then packed away in a tin or wooden box (not too tightly, and a little cotton-wool on the top may be recommended). They will travel safely, care being taken to keep camphor or some other strongly-smelling substance in the box to drive away mites. Of course it is better to set insects at once, if you have facilities for so doing. Experience alone will teach the best localities and modes of collecting in each country. Those who have friends abroad, or who have an opportunity of visiting foreign countries, may collect for themselves, or get others to do so (and it may here be mentioned that many of the greatest rarities have been sent home by missionaries); but those who are not so fortunate must obtain their specimens by purchase or exchange.

In seaport and other towns boxes of insects are occasionally offered for sale by soldiers or sailors, and though generally containing only common species, often in poor condition, yet they are always worth examining, as the reverse may happen to be the case, or a single specimen may chance to be among them worth all the remainder. Entire collections are also offered for sale, either privately or by auction; but it is not advisable to buy insects in this manner, without having had an opportunity of inspecting them beforehand. The value of insects in lots may generally be estimated as not more than that of the perfect specimens in it; for although it is better sometimes to buy an imperfect specimen of an insect difficult to get, or which you may require as a type, it is much better not to fill your drawers with broken or faded specimens of common species, unless

you require them for microscopical or structural examination; nor (if money is any object) can it be recommended to pay fancy prices for the first specimens of some grand new species which arrive, unless from some out-of-the-way place not likely to be soon revisited by a collector.

Foreign *Lepidoptera* may also be purchased from the dealers whose advertisements are published in the entomological magazines, or from the Natural-History agents, bird-stuffers, and dealers in curiosities, whose shops and offices are to be met with in various parts of London, but more especially in Great Russell Street, and the streets between this and Oxford Street. Mr. Marsden, of Gloucester, is at present the chief importer of European *Lepidoptera*.

Wealthy entomologists frequently send collectors abroad at their own expense, and thus receive large numbers of specimens. Opportunities sometimes occur for exchanging specimens with entomologists residing abroad, when specimens may readily be obtained from the Continent, North America, &c.

If all the insects in a collection are re-set in a uniform manner, it will very much improve its appearance. Under sides are exceedingly important in butterflies, but are often neglected.

The most useful introductory book for a beginner is Chenu's 'Encyclopedie d'Histoire Naturelles: Papillons.' This is mainly a cheap French abstract of Doubleday and Hewitson's great work, the 'Genera of Diurnal Lepidoptera,' now out of print and very scarce, the last few copies remaining at the publisher's having been destroyed in the great fire at Paternoster Row some years ago. Chenu's work contains butterflies and *Sphinges*, and is crowded with woodcuts. There is a second volume on moths, but it is too inaccurate to be recommended.

More advanced collectors will require other books, but, in the absence of monographs, it is difficult to know what to recommend. There is a Catalogue of Diurnal *Lepidoptera*, by the present writer, which is the latest compendium of this group; but it contains no descriptions. Walker's List of the *Lepidoptera Heterocera* of the British Museum, thirty-five parts (varying in price from three shillings to seven shillings per part, the parts being sold separately), will be found the

most comprehensive work on the moths yet issued. It contains descriptions as far as the end of the *Pyrilidæ*, the *Micro-Lepidoptera* being much less fully treated; but no plates. It is divided as follows, being paged in seven sections: 1—7, *Bombyces*, &c.; 8, *Ægeriida* and *Sphingida*; 9—15, *Noctua*; 16—19, *Deltoida* and *Pyrilida*; 20—26, *Geometridæ*; 27—30, *Micro-Lepidoptera*; 31—35, Supplement. There is a small work by Morris (without plates) on the 'Described Lepidoptera of North America,' but only one part has been published, containing butterflies, *Sphinges*, and *Bombyces*. There is another, by Ross, on the 'Butterflies and Moths of Canada,' with woodcuts; but it is very incomplete. There are many large and expensive illustrated works on European and foreign *Lepidoptera*; but the best of the cheaper publications on European *Lepidoptera* are probably Staudinger and Wocke's 'Catalog der Lepidopteren des Europäischen Faunengebiets' (without descriptions), Von Heinemann and Wocke's 'Schmetterlinge von Deutschland' (no plates), and Berce's 'Lépidoptères de la France.' The latter has some good coloured plates, which will be found very useful; plain copies are not to be recommended, as the butterflies figured are not described in the text. There are also several popular illustrated works on German *Lepidoptera*, with which I am not sufficiently acquainted to express any opinion. Works treating of separate groups will be noticed in subsequent papers.

Zoological Department, Royal Dublin Society,
February, 1877.

A SIX WEEKS' ENTOMOLOGICAL TOUR IN SWITZERLAND.

By J. C. W. TASKER.

THE tenacity with which English collectors confine themselves to British species, and pay fabulous prices for doubtful specimens of the rarer kinds, which have probably reached the shores of Old England without the aid of their wings, is surprising to an entomologist revelling in the good things which this country so readily offers for his cabinet.

With the hope of inducing some brother *chasseurs* to

come and share the treasures which for eight years I have been enjoying, I pen a few lines suggesting a six weeks' entomological tour. This would, I doubt not, at about the same expense as a similar trip in England would cost, just double the enterprising *voyageur's* collection of butterflies alone, and at the same time open out to him some of the finest scenery in the world.

Starting from Paris by the 8 P.M. train, you are landed by the Dijon and Pontarlier route at Lausanne (Hotel Faucon) at 10.25 A.M., and at Aigle 1.14 P.M. the next day, for a cost of about £3 from Paris.

The cost of living *en pension* in this country, at the places which an entomologist would naturally select, averages from six to eight francs (five or seven shillings) a day, wine, candles and service being extras, but not heavy items. Living *en pension*, however, necessitates at least a week's residence in the same hotel, otherwise hotel prices are demanded, which would raise the amount to ten or sixteen francs the day. At almost all the places mentioned below an agreement can be made on arrival to be placed *en pension*.

I. I should recommend our *chasseur* to make direct for Aigle. He can book his place direct from Paris to Lausanne, and then secure a fresh ticket for Aigle. There are two very good hotels in the town of Aigle (Beau Site and Mon Sejour, *pension* six and a half francs), and one much more luxurious but more expensive just outside the town. In any of these hotels he could locate himself most comfortably for a week or more, and make short expeditions by train to fresh hunting-grounds, besides the numberless walks that can be accomplished in the immediate vicinity.

II. I should next recommend a week's *pension* (five and a half francs per day) at the Hotel des Alpes, Sepey, which is a marvellous place for night-work with light, as well as abounding in promising hunting-grounds. If only my friend Madame Fashnach, the landlady, would put the *chasseur* in the same chamber that I occupied last spring, he would have a perfect storm of rarities round his petrole lamp at midnight. The high road up from Aigle to Sepey (two and a half hours) is one of the most wonderful hunting-grounds I ever visited. There is no knowing what you may catch there. On fine

days butterflies abound in large numbers. The Hotel des Alpes is a small roadside inn, and offers really cleanly, good sleeping accommodation, excellent, wholesome, honest food, and the greatest civility in attendance; I often stay there with my family. A diligence runs daily from Aigle through Sepey, on to Château D'Oex and Rossinières, so there is no difficulty about forwarding luggage by this route; in fact throughout Switzerland you can forward your luggage with safety and at a cheap rate by the post, trusting to your knapsack *en route*.

III. The following week's expedition may very well be omitted if time does not permit of its being carried out. But some valuable *Erebias* may be secured in the neighbourhood of Rossinières, and the route from Sepey is one of the most beautiful in this part of Switzerland. To go to Rossinières your luggage should be sent by the Château D'Oex diligence to Les Moulins, whilst you walk over the Comballaz down to Rossinières from Sepey in about three hours and a half, and on arrival send for your luggage. At Rossinières the Grand Châlet, the largest châlet in Switzerland, affords most excellent food and accommodation (*pension* six francs). It would be well to write beforehand to Madame Raymond, the landlady, as the Pension is much frequented by English, and often full. The return journey may be made on foot over the Col de Jaman, in five to six hours, down upon Montreux (a splendid walk), in time to take the last train to Sion or Sierre.

IV. This route may also be omitted, the next (No. V.) being the most important. Take the train at Montreux or Aigle for Sion: if arriving late in the day stop at Sion, and go on the next day up the Val d'Herens to Evolena; sleep there, and on the following day to Arolla. Up this valley *Parnassius Mnemosyne* and many other rarities, as *Chionobas Aello*, are taken. The valley is very different in scenery from most of the other lateral valleys of the Rhone, and well worth a visit. A whole day would be well spent at Arolla, and by a good walker the return journey may be accomplished in one day easily enough to save the last train from Sion on to Sierre.

V. Taking the last train from Montreux, Aigle, or Sion (as the case may be) you arrive at Sierre in time for the

diligence on to Visp. Send your luggage on by post from Visp to Zermatt, which it will reach in two or at most three days. Sleep at Visp (Hotel Soleil). Start early in the morning to walk to St. Nicholas, as the first part of the journey is very hot. There is only a mule path to St. Nicholas, and care must be taken on leaving Visp not to select the wrong path; the rest of the route is perfectly plain. Half an hour after leaving Visp look out carefully for *Naclia punctata* and *Syntomis Phegea*. St. Nicholas is said to be one of the finest places in Switzerland for moths, and I should strongly recommend sleeping there; even a day or two spent there would not be thrown away. Next day a five or six hours' walk over a most splendid hunting-ground brings you to Zermatt. The Hotels Mont Rosa, Mont Cervin, and the Hotel on the Riffel, are all kept by my good friend Mr. Seiler, a pattern landlord, and his most obliging wife; and *pension* at the two former may be secured at from eight to nine francs per day. The Riffel Hotel is dearer, but a day or two should be passed there for the sake of the higher mountain species. The hunting-grounds around Zermatt are numberless—especially I would mention the Riffel, Gorner Gratt, and Schwarzensee.

By omitting routes III. and IV. the expedition could be compressed into a few days over the month. The Valley of Saas, branching off the Zermatt route at Stalden, is a splendid place for beetles, as also the Creux de Champ at the Diablerets, which may be easily reached from Sepey.

The month for Swiss butterflies is undoubtedly July, but unfortunately this is frequently an uncertain month in point of weather. The butterfly season extends from May to the end of August, but July is *the* month. Numberless other expeditions may be made to branch off the route I have proposed, but these are the localities best known to me as favourable. The route home may be left to the *chasseur* himself after he has learnt his ground, which I feel sure that he will be sorry to leave.

From this narrative some idea may be formed of the expense of the proposed tour, and to give a notion of the captures of butterflies that may be made I append to this a list of the Swiss butterflies that I have myself taken, and the localities arranged according to the districts above alluded

to in the communication. Where no number is affixed the species is found throughout the whole. The names are taken from Mr. Kirby's 'Manual of European Butterflies.'*

Papilio Podalirius. *P. Machaon*. *Parnassius Apollo*. *P. Delius*, iv., v. *P. Mnemosyne*, rare, iv., also on Gemmi. *Aporia crataegi*. *Pieris brassicæ*. *P. rapæ* var. *ergastæ*. *P. napi* and its var. *bryoniæ*, rare, iv., v. *P. Callidice*, rare, v. (Rif. and Sch.). *P. Daplidice*. *Anthocharis Belia*, var. *Ausonia*, rare, v. *A. cardamines*. *Leucophasia sinapis*. *Cotias Palæno*, rare, v. (Rif. Sch.), also Bell Alp and Furka. *C. Phicomone*, iii., iv., v. *C. Hyale*. *C. Edusa*. *C. Edusa* var. *Helice*, i., ii. *Gonepteryx rhamni*. *Melitæa Cynthia*, very rare, v., near Riffel Hotel. *M. Artemis*. *M. Artemis* var. *Merope*, rare, v. (Rif. and Sch.). *M. Cinxia*. *M. Phœbe*, i., iv., v. *M. Didyma*. *M. Athalia*. *M. Dictynna*. *M. Parthenie* var. *Varia*. *Argynnis Selene*, once only. *A. Dia*. *A. Amalhusia*, i., ii., iii., iv. *A. Euphrosyne*, i. *A. Pales*, i., Les Plans, iii., v. *A. Pales* var. *Isis*, iii., Corgeon, v. *A. Ino*, rare, ii., iii. *A. Lathonia*. *A. Aglaia*. *A. Niobe*, iii., v. *A. Niobe* var. *Eris*, iii., v. *A. Adippe*. *A. Paphia*. *A. Paphia* var. *Valezina*, i., v. *A. Pandora*, in Valley of Sixt. *Grapta C-Album*. *Vanessa polychloros*. *V. urticæ*. *V. Io*. *V. Antiopa*. *V. Atalanta*. *Pyrameis cardui*. *Limenitis Sibylla*. *L. Camilla*. *Nymphalis populi*, rare i., one near Sepey, iii., Col de Philisma. *Apatura Iris*. *Melanagria Galathea*. *Lasiommata Mæra*. *L. Hieræ*, very rare, i. *L. Megæra*. *L. Ægeria*. *L. Dejanira*, i., abundant near Hotel des Bains, Aigle, at the end of June. *Hipparchia Proserpina*, i. *H. Hermione*, i., ii., v. *H. Semele*, i., v. *H. Phædra*, i., ii., v. *H. Cordula*, i., ii., v. *H. Lycaon*, v. *H. Janira*. *H. Hyperanthus*. *Cænonympha Iphis*, i., Les Plans, ii., Chamossaire. *C. Arcanius*, twice at Veytaux. *C. Philæa*, iii., Col de Philisma, iv., v. *C. Pamphilus*. *Chionobas aello*, very rare, iv., v. *Erebia Melampus*, ii., Chamossaire, Comballaz, iv., v. *E. Mnestra*, rare, v., on road to Riffel. *E. Pyrrha*, iii., Col de Philisma, Corgeon, Rubli. *E. Ceto*, iii., iv., v. *E. oeme*, between ii. and iii., once only. *E. Medusa*, i., Glion and Rochers de Naye. *E. Pirene*, ii., Diablerets and Chamossaire. *E. Alecto*, very rare, v., Gornier Gratt. *E. Manto*, v. (Rif. and Schwar). *E.*

* I. Aigle district from Martigny to Vevey. II. Sepey. III. Rossinières. IV. Val d'Herens. V. Visp to Zermatt. Rif. = Riffel. Sch. = Schwarzensoo.

Tyndarus, iii., iv., v. *E. Goante*, iv., v. *E. Pronoë* var. *Arachne*, iii., at Rossinieres. *E. Medea*. *E. Ligea*, ii., iii. *E. Euryale*, v. *Nemeobius Lucina*. *Thecla betulæ*, i., ii., iii. *T. spini*, i., ii., iii. *T. W-Album*, i., ii., iii. *T. ilicis*, i., ii. *T. acacia*, i., near Aigle, very rare. *T. quercus*, i., rare. *T. rubi*. *Chrysophanus virgaurea*, iv., v. *C. Eurydice*, iii., v. *C. Eurydice* var. *Eurybia*, rare, v. *C. Gordius*, rare, v., and in Val d'Anniviers up to St. Luc. *C. Dorilis*, ii., iii. *C. Phlæas*, i., v., rare. *Polyommatus bæticus*, i., three close to Aigle, 1876. *P. Tiresias*, i., one on Sepey Road, 1876. *P. Ægon*. *P. Optilete*, v., on road to Riffel. *P. Pheretes*, v., on road to Riffel, just on last ascent up to Hotel. *P. Orbitulus*, iv., v. *P. Medon*. *P. Eros*, v. *P. Icarus* and var. *Icarinus*, i., iii. *P. chiron*, i., Les Plans, v. *P. Adonis*. *P. Corydon*. *P. Dorylas*. *P. Damon*. *P. Donzelii*, rare, v., larch woods to right of hotel at Cervin, end of July. *P. Argiolus*, i. *P. semiargus*, rare, i. *P. Cyllarus*, i., ii., iii. *P. Alcon*, rare, i., Bex, iv. *P. Arion*, ii., iii. *Pyrgus malvarum*, i. *P. lavateræ*, i., ii., v. *P. carthami*? (locality unknown). *P. Alveus*. *P. malvæ*, and var. *lavateræ*, i., rare. *Nisoniades Tages*. *Pamphila thaumas*. *P. Sylvanus*. *P. comma*. *Cyclopides Paniscus*, i., Les Plans, ii., Chamossaire.

The varieties approaching *Athalia* are something extraordinary: variations occurring according to the different heights and localities in which they are taken, each valley seems to present some difference in size or marking. *Apatura Ilia* I have never taken, but I have seen a specimen taken by my butcher near Aigle.

Aigle, Canton de Vaud, La Suisse, Feb. 1, 1877.

NOTES ON CRAMBITES, OBSERVED DURING THE YEARS 1874, 1875, 1876.

By WALTER P. WESTON.

Crambus alpinellus, Hb.—Though not appearing in any quantity, there seems to be no cause for apprehension lest this rare and local species should temporarily disappear. It has, I understand, been taken each season, in its old locality, in the neighbourhood of Portsmouth.

Crambus verellus, Zk.—Since the capture at Folkestone, in 1872, by Mr. C. A. Briggs, of the specimen (now in the collection of Mr. Howard Vaughan) on the authority of which the species was introduced into the British lists, two more specimens have occurred in the same locality: one captured by myself by beating, on the 22nd August, 1874, when collecting in company with Mr. Briggs; and another, taken by him at sugar, in 1875. Now that the *Micro-Lepidoptera* seem to be getting their share of attention we may hope that this species will turn up in tolerable plenty. From the capture of three specimens in different seasons there can be no doubt of its constant occurrence at Folkestone. Nothing is known of its earlier stages, though in all probability the larva feeds on the lichens growing on stones and old tree trunks.

C. sylvellus, Hub., = *adipellus*, Tr.—A fine series of this local species was secured last season, by Mr. E. G. Meek, in the Norfolk fens.

C. uliginosellus, Zell.—Also commonly found by Mr. Meek in company with the preceding species, but the specimens were somewhat worn.

C. latistrius, Haw.—Has occurred sparingly at Folkestone; a new locality for this species.

C. tristellus, W. V.—The life-history of this species has been elucidated by Mr. W. Buckler (E. M. M. xiii.), who has succeeded in rearing it from the egg. From his observations it appears that *Tristellus* is a very voracious feeder, and fully capable in plentiful seasons of doing considerable damage to grass lands. The favourite food of the larva appears to be *Aira flexuosa*.

C. paludellus, Hub.—A few were taken by Mr. Meek in the Norfolk fens, in 1876; but the species was by no means common. Mr. Tugwell also found it sparingly there the same season.

Anerastia lotella, Hub.—Another insect whose early history has been elucidated by Mr. W. Buckler. The larva feeds on the plant-stems of *Psamma arenaria*, near the roots, and is often buried by the shifting surface of the sands.

Ephestia pinguis, Haw.—Occurs plentifully in Regent's, Hyde, and Finsbury Parks, London. It emerges from the pupa late in the afternoon; and specimens may be found on

the tree-trunk drying their wings from four till half-past eight, or until it is quite dusk.

Ephestia elutella, Hub.—Mr. W. Buckler records having bred his species from larvæ feeding on dog-biscuit and an old cloth coat. They feed through the winter, change to a pupa in March or April, and the perfect insect emerges in the early part of July. Mr. Buckler fully describes the larva and its habits (E. M. M. x. 213).

E. artemisiella, Steph.—Has occurred sparingly in South Wales, in 1876.

Cryptoblabes bistriga, Haw.—Specimens were taken at Folkestone last season.

Gymnancycla canella, W. V.—Several specimens of this insect have been bred from larvæ collected on the coast, feeding in the stems of *Salsola kali*. Most of the imagos emerged the following spring; but some remained in the pupa state until the second season.

Phycis betulella, Goetz.—Has been taken in 1876, at West Wickham and Folkestone.

Pempelia genistella, Dup., = *davisellus*, Newman.—This species appears to have been described several times before it was named by the late Mr. Newman, in honour of its discoverer in England. The late Mr. Doubleday (Entom. viii. 41) mentions having sent specimens to Dr. Staudinger, who returned them as being without doubt the *Nephopteryx genistella* of Duponchel. Herrich-Schäffer next described and figured it as *Ulicella*, from specimens taken in Andalusia. Mr. Doubleday—having sent a type to Professor Zeller, to whom it was unknown—described it for the third time as *Albiliniella*, in the Stett.-e-Zeit., 1859, p. 223. In order to place our nomenclature as much in accord as possible with the continental lists Duponchel's name must be adopted, and the synonymy will stand thus:—

Genistella, Dup.

Ulicella, Herr.-Sch.

Albiliniella, Doub.

Davisellus, Newman.

An account of its life-history is published in the 'Entomologist' (Entom. vii. 132) by Mr. Moncreaff, who also states that the imago is figured in Morris's 'British Moths' as *P. palumbella*, with which I am unable to agree. In his

description of the species figured by him, Morris gives as localities, "York, Lewes, Manchester, Worthing, Bristol, Birkenhead;" and its situations, "heaths and moors;" thus clearly showing that his figure refers to the *P. palumbella*, W. V., and not to *Davisellus*, Newman, which was unknown to him.

Rhodophæa suavella, Zine.—Mr. W. Buckler (E. M. M. xii. 13) describes the habits of the larva. It feeds not only on sloe, but also on whitethorn bushes, and is not scarce in the stunted hedges along the railway banks around Esher, where in some seasons the perfect insect occurs commonly.

R. marmorea, Haw.—Mr. Buckler (E. M. M. x.) records having bred this insect, and fully describes the larva, which feeds on dwarf sloe, generally choosing low stunted bushes, and spinning the leaves together in a web, so as to conceal its operations from view. It pupates among the leaves of the food-plant, and remains in that state about four weeks. It is much scarcer than the preceding species, and, as far as I am aware, does not occur in the neighbourhood of London.

1, Duncan Terrace, N.

CIDARIA FULVATA, VAR.

By F. BOND, F.Z.S.



CIDARIA FULVATA, var.

THIS variety of a very beautiful, though common, species was taken in the Isle of Man a few years ago, by a friend of the late Mr. E. Hopley, and came into my possession, shortly after his lamented death, on the dispersion of his fine collection of British Lepidoptera. I have seen many hundreds of this insect, but never saw a variety before. I believe a similar specimen has been taken by the gentleman who captured my insect.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 89.)

Fig. 64.



NEUROTERUS FUMIPENNIS.

Fig. 65.



NEUROTERUS LAEVISCULUS.

64. *Neuroterus fumipennis*, Hart. (*Spathogaster varius*, Schenck).—This gall is found, according to Schlechtendal, on *Q. pedunculata*, and is distinguished from the former by its margin being more or less raised, its smaller size,—only reaching to a diameter of three millimetres,—and by its markedly thinner appearance while still on the leaf: Von Schlechtendal also writes me that this gall is always of a more reddish hue, and that he has never met with a specimen showing the yellow colour of *N. lenticularis*. It is scantily covered with short radiating hair, of a rusty red, and after falling it swells considerably at its under side. Schlechtendal obtained the gall-flies, which differ considerably from the former species, between the end of April and the middle of May.—G. L. MAYR.

This species is moderately common, and widely distributed in Britain, though nowhere so abundant as *Lenticularis*. I have collected many hundreds of the galls, but never yet succeeded in breeding the makers; they are later than the former species—hence probably my failure, as it is difficult to keep the spangles moist without moulding, during their growing or swelling state, through the winter; this gall, like the former, makes a home for *Synergus Tscheki*. Marshall, in his descriptions of the British *Cynipidæ* (E. M. M. iv.), seems

to have confounded this species with *Spathogaster tricolor* (l. c. p. 147). The only oak spangles I have ever met with on the upper side of the leaf have belonged to this species.—E. A. FITCH.

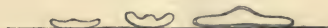
65. *Neuroterus laeviusculus*, Schenck (*N. pezizæformis*, Schlechtendal).—Both insects and galls from both authors lie before me, so that I am in a position to judge of their identity. This gall only differs from the above-mentioned species, viz., *N. lenticularis*, as follows—that it is smaller, and is more sparsely covered with hairs. It sometimes may be found on the upper side of the leaf. In all the examples I have now at hand there is in the middle a more or less well-defined boss, whilst in the gall of *N. lenticularis* no distinct boss occurs; its margin is often upturned, through which it sometimes becomes difficult to distinguish it from the gall of *Fumipennis*. Schlechtendal states that the fallen galls are stout above, but only very slightly arched below, but the fallen galls received from him—those showing the exit hole of the fly—and those from Von Heyden, in his opinion Schenck's type, are both as stoutly arched on the under side as on the upper; at all events yet wider observations are necessary to accurately differentiate the three last species of galls. Herr v. Schlechtendal bred the gall-flies at the end of February (Schlechtendal has it "ende Januar"), from typical galls kept in a hot room.—G. L. MAYR.

For my first authentic acquaintance with the closely-allied galls of this species I have to thank Miss E. A. Ormerod, who kindly sent me specimens from Kew (Surrey) and called my attention to their specific value; since then I have recognised specimens both in Essex and Suffolk, and when the difficulties of discrimination are surmounted I have no doubt it will be found to be generally distributed;* I had previously considered the galls to be immature *lenticularis*. The following may help to identify the three species:—Suppose we take the nearly flat, deflected, brown pubescent galls of *Lenticularis* as the type; now from these *Fumipennis* may soon be learnt to be distinguished, but the difference is hard to depict without the galls themselves: however, *Fumipennis* differs much from the type species, both in colour and shape;

* Mr. Bothers has met with these galls in the neighbourhood of Nottingham.—E. A. F.

it is green, with a carmine margin, or wholly of a deep red colour; it is almost smooth (slightly wrinkled), and on the upper side there are indistinct radiations from the centre to the circumference; it is without the stellated hairs, which are so conspicuous on *Lenticularis*. Again, in shape, while *Lenticularis* is highest in the centre, and gradually flattened towards the periphery, *Fumipennis* is most distinctly raised at the outer edge, and the gall is consequently cupulate, with the exception of a small papilla in the centre; superficially *Fumipennis* is smaller than *Lenticularis*. *Læviusculus*, the third species, is intermediate between the two, having the form and size of *Fumipennis*, but is rather thicker than that species, having in shape a great resemblance to a plain pearl shirt-button, in miniature, with a distinct wart in the centre, and the colour and colorational pattern of *Lenticularis*, with the exception that it is less pubescent, and the stellated hairs are very distinctly shorter and much less conspicuous than in that species. (The accompanying figures, which exhibit the three galls in section, will perhaps give a more distinct idea of their respective forms.) *Lenticularis* galls are gregarious,

1 2 3



1. *N. lenticularis*. 2. *N. læviusculus*. 3. *N. fumipennis*.

whilst *Fumipennis* and *Læviusculus* are solitary; hence we never find the latter so crowded, and consequently distorted, as is frequent with the commoner species. I should say that the above remarks refer more particularly to the galls as seen in November, that is just before their decidence. I had hoped here to have included some collected notes on the synonymy of these species, but that may be deferred; however, I may say that from Schlechtendal's descriptions of the galls in the 'Entomologische Zeitung,' his *Fumipennis* seems more to accord with *Læviusculus*, whilst his *Pezizæformis* description might well stand for *Fumipennis*, as understood by me; e. g., he says of *Fumipennis*, "mit sehr kurzen braunen Sternhaaren besetzt," and of *Pezizæformis*, "flach mit

sparsamer Behaarung oder ganz kahl . . . die Oberseite ist fein radial gestreift." *Cullinome sodalis* was bred from these galls by Schlechtendal in March and April of the second year.—E. A. FITCH.

ISOCOLUS SCABIOSÆ: A CYNIPIDEOUS GALL-MAKER NEW TO BRITAIN.

By EDWARD A. FITCH.



ISOCOLUS SCABIOSÆ.

WHEN Dr. Giraud described this species he had but Hartig's arrangement to follow; this he did faithfully, and in consequence this gall-fly was described by him as *Diastraphus scabiosæ*. Hartig's classification was in many respects a very natural one; but the generic distinctions were made to rest on very superficial and unsatisfactory characters. The arrangement of the *Cynipidæ* has since been elaborated by Dr. Förster; however, I must say, I have not been able to grasp his synopsis at present, but the divisions must, I am afraid, always be very difficult and involved, the insects themselves having a most marked resemblance both in pattern and structure. This refers to *psenidous* and *inquilinous* genera alike; but amongst the productions of the gall-makers we have some very natural allies, which have served, and probably will continue to do so, both in the differentiation of species and erection of genera. Förster seems altogether to have ignored the life-histories; but

respecting the imagos his synopsis is certainly very elaborate, —possibly more elaborate than clear, as there are many gall-making species which I am unable to relegate to any of his divisions; and, unfortunately for his successors, the insect now under notice is made to serve as a type for two widely-separated genera,—*Isocolus* and *Eubothrus*; were it a solitary instance it might possibly be accounted for by the fact that Förster understood Giraud's species to include both the gall-maker and the *Aulax*, a genus now divided, partly *inquilinous* and partly gall-producing. The dwellers in the galls of *Rhodites* and *Diastrophus* bear a most remarkable resemblance to their hosts; in fact it requires great care to distinguish them, differing as they do in many instances in but a few secondary structural characters, the colorational pattern being identical. However, this is not a note on classification; so suffice it to say that *Scabiosæ* is very properly separated from *Diastrophus*, but it is impossible to give the characters concisely. *Diastrophus* is, as far as we at present know, limited to gall-makers on *Rubus* and the allied *Potentilla*. *Aulax* is often an inmate in its galls, and resembles it most closely, as has been said. We only have one species in Britain, which galls the stems of the dewberry (*Rubus cæsius*) and its allies; but our *Potentilla* gall, the maker of which is now referable to *Aulax*, may possibly have a closer relation: the *inquiline* has been described as the maker of the gall more often than otherwise. Giraud's diagnosis of our species is as follows:—"Niger, breviter pubescens; geniculis, tibiis tarsisque ferrugineis; capite thoraceque dense coriaceis, opacis; facie et pleuris aciculatis. Areola nulla. Ant. mas 14, fem 13 art. Long, 2—3 mm." (Verh. z.-b. Gesell. Wien. ix. 368). For the enlarged description reference must be made. The specimen I have bred agrees with his description, with the exception that the areola (second cubital) is well defined,—he says, "areola nulla:" this may point to the *inquiline*, of which, should I obtain fresh galls and breed, I may have more to say hereafter; as it is, Giraud's description must be left as sufficiently correct. The gall—which occurs on the leaf-stalk of the *Centaurea scabiosa*, the species with the pinnatifid leaves—consists of an irregular oviform swelling on the midrib, situate at the base of the leaf, where it shoots forth from the petiole; it is but

slightly lighter in colour than the leaf itself, which it resembles in structure and in the amount of pubescence: it is single-celled; but Giraud says it contains "Un grand nombre de petites cellules disposées sans ordre." This specimen was unmistakably inhabited by the inquilines; but whether all were so it would be difficult to say. For this addition to our Fauna we are indebted to Mr. W. C. Boyd, who found the gall at Topley Pike, near Buxton, Derbyshire, in the autumn of 1875, and kindly sent me the specimen from which I bred the producer. Dr. Giraud says it appears to be very local; but should it be again met with I should be very thankful for fresh specimens, as there is much about the species which is still unsatisfactory.

Maldon, Essex.

MELANOCHROISM, &c., IN LEPIDOPTERA.

By F. BUCHANAN WHITE, M.D., F.L.S.

I AM happy to meet so gallant a knight as Mr. Nicholas Cooke upon a field affording so much scope for discussion as that of variation in *Lepidoptera*, and gladly accept his challenge.

In the first place—if I read his remarks aright, and their meaning seems certainly plain enough—Mr. Cooke uses the term "natural selection" in a sense in which no one else does, namely, the selection of their partners by the female insects. This, if Mr. Cooke likes, is "sexual selection"; "natural selection" it certainly is not.

"Natural selection" may be defined as the weeding out of all but those individuals who are best fitted to survive in the struggle for existence, and this weeding (for the most part—like the majority of the universal mother's operations—a gradual process) is carried out by many and various agencies. It may happen that in certain districts dark forms of certain species have some advantages over their lighter-coloured brethren. By their more obscure colour they may escape detection by their enemies, and hence have a greater chance of being the means of continuing the species than the more conspicuous lighter-coloured individuals; or, in another district the very reverse of this may occur, and the advantage

be on the side of the light-coloured. For example, *Gnophos obscuraria* is dark on dark soils, light on light-coloured soils,—and why? This species always rests on or near the ground. On a pale soil the lighter-coloured individuals will escape detection, when those of a slightly darker tint will be seen and destroyed. No doubt not all the pale ones will escape, but more pale than dark ones will, and a majority of the broods will spring from pale parents. This will be continued generation after generation, till that exact shade of colour which experience shows is best fitted to secure protection is attained, and all the individuals in the district are of that tint. If a darker or lighter individual appear in a brood (and, by the laws of heredity, it is likely that such will sometimes appear) it will soon be weeded out. Let us now suppose for a moment that from some cause the soil, rocks, &c., of this district are changed from light to dark. What will follow, then, to our light-coloured race of *Gnophos obscuraria*? Circumstances will now favour the darker individuals; and instead of their being weeded out they will be preserved, and the light-coloured ones will perish; and this will continue till the dark-coloured race are alone in possession of the ground.* Now all this happens not by any premeditated act or desire on the part of the insects themselves, but by that law of Nature which gives the pre-eminence to those best suited to hold their own in that great struggle for existence which is going on all around us. What I have said is equally applicable to all the stages of existence, —egg, larva, pupa, or imago,—and shows how the variation, once established, is kept up and intensified *if found to be advantageous*.

But what is the exciting cause of this tendency to variation? I think it is (in some cases, at least) meteorological, that is to say, cold or heat, dryness or dampness, presence or absence of sunshine, &c. It has been proved experimentally that temperature has a very great influence in modifying the colour of insects,—to so great a degree, in fact, that broods so modified have been considered to be specifically distinct. Some of the melanochoic races may be due entirely to

* At the same time it seems worthy of note that a majority of the *very* pale varieties of the various European species of the genus *Gnophos* are usually of more southern distribution than the typical forms.—F. B. W.

meteorological causes, and not dependent at all upon natural selection.

Mr. Cooke suggests that the geological formation is a possible cause of variation, and I cannot say that it is not so; at the same time it requires proof. As for the occurrence of pale forms on chalk and other light-coloured formations, that is brought about by natural selection, not by the geological formation. The range of certain species may be confined to certain formations, but that is, perhaps, not due to the formation itself, but to the food-plants being confined to that particular formation. Still, however, plants common to various formations may on one formation acquire some chemical constituents that may make them, in this case only, suited to be the food-plants of certain species, and hence the range of the insect be restricted to that formation, though the food-plant is not. In the same way the food-plants may on certain soils affect the colours of the insects; but if it is so at all it is probable only in a few cases. The influence of the food-plant upon the colours of insects seems not to be very great, though there are a few species which are *theoretically* supposed to have become separated from other, closely allied, species by modifications induced by the food-plant. If my memory serves me, *Eupithecia pulchellata* and *E. linariata* are instances of this supposed influence.*

The history of the smoky varieties of *Tephrosia biundularia* is very interesting: they may, perhaps, be due to chemical influences on the food-plants. If such is the case it ought to be easy of experimental proof. (As this variety is still, I believe, nameless, I take this opportunity of suggesting for it the name *Delamerensis*. It is, of course, rather an aberration than a variety, taking these terms as defined by Dr. Staudinger.) This aberration and the ab. *Doubledayaria* (Mill.) of *Amphidant betularia* are, however, exceptional cases, and cannot be considered as throwing much light on the origin of the majority of melanochoic forms.

The latter part of Mr. Cooke's paper (though of equal or greater interest) treats of a different subject, and one to which I also have paid some little attention. My investigations in

* Since this was written some facts have presented themselves to me which suggest the idea that *Ino staticee* and *I. Geryon* may be instances of modification produced by different food-plants.—P. B. W.

this direction have chiefly been amongst the European *Rhopalocera*,* and seem to show that the specific differences in the genital armature are much greater in some genera than in others. When in very *closely-allied* species the structure is found to be *identical*, it seems to be questionable whether the species are really distinct. The value of the character in the genus or family must, however, be taken into consideration in forming a conclusion on that point.

Perth, April 4, 1877.

ON MELANISM AND VARIATION IN LEPIDOPTERA.

By W. PREST.

HAVING for some years taken great interest in melanism and variation in *Lepidoptera*, I should like to write a few lines on the subject. I am of opinion that we shall have to look still further than Mr. Nicholas Cooke seems to think for the true cause of melanism and variation, for I have no doubt that whatever the influence is which causes the one also affects the other. I do not think that either chemical fumes or coal smoke can have any influence in this district of Yorkshire, which is purely agricultural: we have very few tall chimneys and no coal pits nor chemical works; and yet we meet with many cases of variation, and some of melanism, in *Lepidoptera*. Take for instance the genus *Acronycta*: in *A. ligustri* the form we usually find is suffused with dark olive-green; we very rarely see the white-crested form. I took thirteen specimens of this species at sugar one season some years ago, and of these, ten were this olive-green type, with no white markings. Again, about Liverpool, the entomologists take or breed *A. menyanthidis* of a very pale form; those we take near York are nearly black, and the light form is very rare. *A. rumicis* also occurs nearly black at times with us. I have taken *A. leporina* for nearly twenty years, but never yet took the pale form near here; ours are all the variety *Bradyporina*. Chemical fumes and coal smoke cannot, in these cases, be the influencing cause. How is it that in the New Forest the female of *Argynnis Paphia* is

* If Mr. Cooke cares to see the result of my investigation, he will find it in a forthcoming part of the Linnean Transactions. The paper is at present, I believe, in the printer's hands.—F. B. W.

often taken nearly black (the variety *Valezina*), and yet in Lancashire and Yorkshire I never heard of a specimen occurring? Some years ago I took near this a very dark female *A. Aglaia*, but certainly not within miles of either large towns, tall chimneys, or even railways. Again, on the same ground where we take the dark form of *Acronycta menyanthidis* we take *Epione vespertaria*. Of this I have taken during the last twenty years, at odd times, four dark varieties, and, rather singular to say, all these were caught within fifty yards of the same spot, though in different seasons. I have bred hundreds, nay I may say thousands, of the ordinary type, but have never myself reared, nor heard of anyone else rearing, a variety of this species.

I will now take a case of true melanism. I have for the last eighteen or nineteen years been continually breeding *Eupithecia albiguttata*: about seven years ago I bred one specimen of a smoky black colour, without any markings or white spots, only with a blacker spot in the centre of superior wings; two years ago another specimen; and last year (1876) four specimens—all exactly the same form. Although I have taken the larva of this species in many localities, all these cases of melanism come from the same wood.

We take *Xylophasia polyodon* near York as black as, and I think even blacker than, any I have seen from Scotland. The dark markings on *Arctia lubricipeda* are more prone to radiation about York than in any locality I know. Of *Abraxas grossulariata* we have had all forms, from nearly all black to almost white; and I bred one two years ago semi-transparent. *Cidaria suffumata* is sometimes all dark rich brown. I have taken two specimens at York of *Cirradia xerampelina*, both of the dark rich Maux form (var. *Unicolor*). Specimens of *Amphydasis betularia* have been bred, both black and intermediate, but these are exceptional. Of *Teniocampa opima* I have specimens nearly black without markings, excepting outlines of stigmata and subterminal line. *Epunda viminalis* has in some years been very abundant, and most of them nearly black. I could give very many more cases, but I think I have named sufficient for my purpose.

From these facts I form my opinion that soil in its action

upon the food-plant has more to do with variation—heredity or otherwise—and melanism, than either chemical fumes or coal smoke. If the two latter, how is it that there are not in Lancashire cases of melanism in such insects as *Liparis salicis*, *L. auriflua*, *Cabera pusaria*, &c.?

I should like to hear the opinion of such gentlemen as Messrs. Hellins, Buckler, Bond, Gregson, Harwood, Barrett, Green, Crewe, and others of equal observation and practical knowledge. They must have met with many very interesting cases of melanism and variation in their entomological experience, the publishing of which might open our eyes to new facts, and probably give a clue to some other theory than any yet propounded.

13, Holgate Road, York, April 14, 1877.

CAUSES OF MELANISM IN LEPIDOPTERA.

By E. K. ROBINSON.

THE most important of these seems to be the condition and nature of the food-plant; for I have noticed that when the larva has been reared upon succulent and overgrown herbage, the imago generally assumes a larger size and paler shade of colour. This appears distinctly in specimens of the common silkworm-moth (*Bombyx mori*), whose larvæ have for two generations fed upon the juicy lettuce, when placed side by side with others from the mulberry. The silk also produced by the former is inferior and of a pale green tint. Again, most of the marsh moths, and those whose larvæ feed on reeds and other plants growing in water, show a large preponderance of white in their colouring. Take for instance the whole genera *Nonagria* and *Leucania*. Again, gloomy woods where the air is damp, and the plants bleached and straggling, are the haunts of pale dull moths, such as the genera *Acidalia*, *Cabera*, and others. The different varieties of *Lomaspilis marginata* seem a good instance of the effect of locality; I have three dark distinctly-marked specimens, all caught upon a somewhat bare hill-side; and several others with scarcely any

black margin at all—and these were taken in a damp and gloomy copse. On the other hand, plants which are stunted in their growth—as in the neighbourhood of manufactories, ill-watered districts and hill-tops—seem to produce dark varieties, as was partly noticed in the ‘Entomologist’ for April (Entom. x. 93). Food in a semi-withered or dry condition produces dark moths of small size; for *Amphydasis betularia* thus fed becomes in a few generations completely black; and by the same means the proportion of black to white in *Abraxas grossulariata*, and of brown and black to white and red in *Chelonia cava*, is largely increased. Chalk districts seem, as a rule, to be inhabited by insects of a bright, light colour, such as *Lycæna Corydon*, *L. Adonis*, and numbers of *Geometræ*, in which a clear chalky white takes a prominent place. Excessive cold is productive of a bleached appearance in all branches of the animal world. Lastly, plants possessed of resinous or other strong vegetable properties may be said in general to produce dark brown moths—*Boarmia abietaria*, &c., *Thera variata*, *T. juniperata*, *T. simulata*, are a few instances out of many. These facts seem to point to four conclusions:—(1) A large percentage of water in the tissues of the food-plant tends to produce a large pale variety; while small, dark specimens result from dry and stunted food. (2) Resinous and other strong vegetable properties produce distinct brown markings. (3) Chalk soils produce a chalky white or bright colour in insects: conversely we would expect rich loamy soils to be haunted by deeply-coloured moths. (4) A cold climate, or the gloom of damp dark woods, causes a bleached appearance and general absence of distinct markings. Hence a bright and hot sun-light may be supposed to produce bright distinct colours. Experiments in rearing insects by various collectors during the coming season might—by the uniformity of their results or otherwise—fairly settle this much-vexed question of melanism, which is so obviously connected with development of species as to become highly important.

St. Leonard's, April, 1877.

RECREATIONS OF A COUNTRY DOCTOR.

By H. W. LIVETT.

CONCERNING SUGAR; WITH A FEW WORDS ON IVY.

ALL men (save those who expect nothing) have their disappointments, and entomological collectors are not excepted. My experience of sugar last season was a falling off from the previous year's results; and I hear from numerous quarters that others have been equally, if not more unfortunate. The laws governing scarce and plentiful years as regards insects appear to be, as yet, in a great degree beyond our ken. Is it probable that the long-continued rains of winter and spring destroyed many in the pupa state? or do the recent enactments relating to the destruction of birds cause empty spaces in our cabinets, as well as on our fruit shelves? Whatever the reason, my list of captures at sugar—applied, as usual, to my espalier trees—is a short one. *Noctua xanthographa*, *Triphæna pronuba*, and *Xylophasia polyodon* (*mirabile dictu!*), wonderfully few; *Catocala nupta*, plentiful—I took about eighteen or twenty; *Noctua rubi*, a fair number; *Agrotis saucia*, about a dozen; and its cousin, *A. suffusa*, plentiful; *A. segetum*, a pest from its numbers; *Noctua C-nigrum*, plentiful; a few *Scopelosoma satellitia*, *Acronycta tridens*, *A. rumicis*; two *Cosmia diffinis*; *Miselia oxyacanthæ*, plentiful: one *Xylina semi-brunnea*: and several *X. rhizolitha*,—with my old friends, *Anchocelis pistacina* and *Polia flavocincta*, nearly make the list. The latter two were quite as numerous as in 1875, though they appeared much later. On the 15th September I saw the first specimen; during the following fortnight I took upwards of a hundred *P. flavocincta*, while *A. pistacina*—which I did not take—were, as the auctioneers say, “too numerous to particularise.”

I am surprised to find *P. flavocincta* to be, to a certain extent, local. I had numerous applications for it last year from all parts of England. One correspondent in Hertfordshire said he had collected thirty or forty years, and had never met with the species; and another in Yorkshire told me, that although he had often seen *P. chi* by the dozen sitting on walls, he seldom met with one *P. flavocincta*.

A few words as to ivy bloom. In my former paper I said that I had never been successful at ivy; but a passage in Mr. Greene's delightful little book, the 'Insect Hunter's Companion,' describing its great productiveness, induced me to give it another trial,—the rather, as the bloom was particularly fine last year. As the blossoms are, in my neighbourhood, chiefly on high walls—otherwise out of reach—I provided myself with an alpenstock, wherewith to shake the bushes, and one of Mr. Bignell's trays, in which to receive the *Xylina petrificata* and *Dasycampa rubiginea* as they came "dropping in."

I had the experience of some five or six visits, on as many evenings. The results were—two *Xylina semibrunnea*, some five-and-twenty *Cerastis spadicea*, half a dozen *C. vaccinii*, some worn *Orthosia macilenta* and *O. lota*, two or three *Geometra* larvæ, and no end of wood-lice—"grandfathers," as they call them here—fell into my toils. I hope I shall see in the 'Entomologist' that some brother or sister collectors were more successful than I.

Wells, Somersetshire.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

RE-DISCOVERY OF MYCHOIS CERATIONIÆ.—I am glad to inform your readers that *Mychois cerationiæ* has been again taken in this country. Mr. Stainton, in his 'Manual,' records the capture of but one specimen. For the last three years, however, specimens have been taken by myself and by one or two friends in a warehouse in London. I hear, through the kindness of Mr. C. G. Barrett, that Professor Zeller states he has bred it from pods of the locust bean (*Ceratonia siliqua*); but I have reason to believe that the specimens I have taken were fed upon almonds imported from Tarragona and the Island of Iviza.—A. B. FARN; The Dartons, Dartford, April 5, 1877.

SUPPOSED DISCOVERY OF A NEW BRITISH NEPTICULA.—I have this day bred from agrimony (*Agrimonia eupatoria*), collected at Witherslack last October, a *Nepticula* so abundantly distinct from any British species I have hitherto seen, that I fancy it will prove to be *Nepticula anecefasciella* of

Herrich-Schäffer, and an addition to the British fauna. The name seems applicable, for the ground colour is bright dark purple, and the double fasciæ, as I may call them, are of a bronzy golden hue. When this gem was walking about it reminded me of a very minute *Micropteryx albionella*, with the markings of *M. mansuetella*. I have been careful to keep the mines of this novelty separate for reference.—J. B. HODGKINSON; Preston, April 15, 1877.

SPHINX PINASTRI.—This afternoon a pupil of mine—T. N. Waller, son of Rev. T. H. Waller, of Waldringfield Rectory, near Woodbridge, Suffolk—brought me a moth to look at, which he told me had been taken by the gardener on a tree in his father's garden last Midsummer. I immediately recognised it as a fair, though not first-rate, specimen of *Sphinx pinastri*.—(Rev.) A. H. WRATISLAW; School Hall, Bury St. Edmund's, April 17, 1877.

COLIAS EDUSA var. HELICE.—I may mention that during a short stay in the Isle of Wight, in August last, I secured—among numbers of typical *Colias Edusa* and *C. Hyale*—two very fine specimens of the var. *Helice* of the former. They were both taken in a clover field, near Ventnor. I believe Mr. Rogers, of Freshwater, to be mistaken in saying *Helice* was common there last autumn (Entom. ix. 231). He told me that he considered the white var. of *C. Hyale* identical with *Helice*. This probably explains their abundance.—BERNARD COOPER; Fern Lodge, Higham Hill, Walthamstow, January 17, 1877.

LYCÆNA ARION.—The notes which you have published on *Lycæna Arion* in the 'Entomologist' make me think that perhaps it may interest your readers to have an account of the insect by one who has observed it in another of its haunts, the Cotswolds, especially as my experience is rather different from that of Mr. Mathew. The first time I saw *L. Arion* was on June 20th, 1870. There were numbers flying about, many in good condition, but some already worn; and I have no doubt the insect might have been taken a week or ten days earlier, that is about June 10th, while the date on which Mr. Mathew took the insect that same year was July 7th. I have since observed *L. Arion* in the same place on June 15th, 1871; June 21st, 1873; and June 18th, 1874. You will see, therefore, that I put the right time to look for the insect

three weeks earlier than Mr. Mathew,—which is strange, as one would expect Devonshire to be an earlier locality than Gloucestershire. On the other hand, Mr. Mathew has not found them in very good condition. Though I have observed *L. Arion* several years, I have never seen it nearly so common as in 1870: then, it was to be found everywhere in the open spaces among the beech woods; since, I have only seen it in a few favourite corners. What I have heard from other collectors bears out the conclusion that the species is rapidly becoming more scarce. The locality being within easy reach of both Cheltenham and Gloucester, the insect has been well “worked” by the collectors of both places. I differ from Mr. Mathew in thinking it an easy insect to take, and consider Dr. Bree right in describing the usual flight as not unlike that of *Chortobius pamphilus*; but I have also seen it careering wildly about the hollies and low bushes like *Lycana Argiolus*. It is easy to recognise the flight of the female when laying eggs, as she travels in a business-like way from plant to plant, hardly ever rising more than a foot or two above the ground and settling every few yards, till she finds a sprig of thyme to her taste: then the wings are closed over the back, the insect turns round and round, like a dog preparing to lie down, and finally bends down her body and deposits an egg between the leaflets near the end of the sprig, and is off in search of another likely plant. While this process is going on the collector can come within a few feet without disturbing her, can gather the chosen sprig as she leaves it, and follow the same insect from plant to plant. I have taken eggs in this way three years; but the friends to whom I have sent them have failed to keep the young larvæ alive for more than a few days. Still I hope that this plan will be tried again with better success; and that we may have an English description of the larva before it finally disappears from the land and is no more seen.—W. C. MARSHALL; 122, Mount Street, W., March 2, 1877.

BOLETOBIA FULIGINARIA.—I took here, sometime last summer, a specimen of *Boletobia fuliginaria*. As I did not know what it was at the time, I did not make any note of the capture, so cannot tell you the exact date. If my memory serves me it was in June, while after *Procris statices*. At all events I captured it in the same lot of meadows where

P. statice usually occurs; of that I am certain. The specimen, which is a worn male, has been kindly named for me by Mr. W. H. Harwood, of Colchester.—H. JONES; Hawley, Farnborough Station.

DESCRIPTION OF THE LARVA OF *EPHYRA OMICRONARIA*.—The Rev. P. H. Jennings, of Longfield Rectory, Gravesend, very kindly gave me the opportunity of rearing the larva of this species by sending a few eggs on the 10th of June, 1875. They hatched on the 21st of the same month, and the newly emerged larvæ were pinkish brown, with the sides paler. Being supplied with maple and sycamore they fed on both, though probably the former is the only food in a natural state. A larva being well grown by the 5th of July, I took down the following notes on it:—Length about an inch, and of average bulk in proportion; the head has the face flat, but the lobes rounded, and is broader than the 2nd segment. Body cylindrical, and of almost uniform width throughout; the 9th, 10th, and 11th segments very slightly broader than the remainder. Skin smooth, but has a few scattered very short hairs; segmental divisions well defined. Ground colour rather dark, but clear velvety green; head chocolate-brown, with paler markings. Mediodorsal line yellow; it commences on the head, and is conspicuous throughout the entire dorsal area: subdorsal lines waved, also yellow, as are the subdorsal region and the segmental divisions. Spiracles and the usual tubercular dots distinct, black. Ventral surface pale green, with small black tubercles; the segmental divisions black. The pupa is shaped like the others in the genus; it is attached to the leaf at the tail, and by a belt of threads passing over the body in the same manner as in the *Pieridæ* amongst the *Diurni*. It is about half an inch in length, stout and broad at the head, but gradually and evenly attenuated towards the anal extremity. Eye- and wing-cases prominent. Colour dull green tinged with yellow; and there are three yellowish lines throughout the entire length of the dorsal area; the rest of the dorsal surface is marbled with brown, and the wing-cases have a deep smoke-coloured edging. The winter was passed in this stage.—Geo. T. PORRITT; Highroyd House, Huddersfield, April 7th, 1877.

THE METAMORPHOSIS OF *STAUROPUS FAGI*.—In the March

number of the 'Entomologist's Monthly Magazine' there is an account of the metamorphosis of *Stauropus fagi*, by Mr. Birchall. He had two opportunities of watching the moulting of the larva, and describes the legs as being drawn out of the old skin after the manner of crustaceans; and not, as I said, doubled up at the sides of the body, from which position they could not be extricated until the skin had been pushed back a considerable way. What Mr. Birchall says about one of his larvæ not renewing a lost joint at subsequent moultings must be conclusive, for if the skin were cast in the way I described the larva would surely have been provided with an entire limb at the next moult. At the same time I acknowledge it is difficult to divest my memory of what I undoubtedly thought I saw, and which must have been an "error of observation." When I sent my paper to the 'Entomologist' (Entom. ix. 269) I was not aware that what I depicted was new to those who had had opportunities of watching *Fagi*, although it was both new and surprising to myself; and on reflection it seemed probable that an insect which was unique in its form should be unique in its habits. It would be interesting to know whether, *theoretically*, it would not be consistent for the legs to be produced from under the skin of the body, and not from within the old pairs, for this reason: when the larva changes to pupa it always rejects such parts as would be superfluous in the making of the future moth, such as the prolegs, the apparatus for biting, &c. (I only speak of such parts as are essential to the existence of the larva, not the accessories,—as hairs, &c.) Now the three pairs of thoracic legs are required for the insect in its perfect state; and if they were packed away under the skin, in the way I described, when this skin is finally cast off by the pupa, the new pairs would be retained within the case, weak and tender, and deferring their development till the other parts were matured against the emergence of the moth. Taking the other view, the legs ought either to be thrown aside altogether when the larva makes its last change, or else they should be drawn out of the old skins, as on previous occasions, and be external to the pupa, requiring thus a casing for themselves, more after the fashion of *Coleoptera*. Although all Lepidopterous larvæ bear but little likeness in form, and none in habit, to the

perfect insect, it is certain that no other form would be so fit an antecedent; and every time the larva changes its skin it gains something in its internal structure that it had not before,—a gradual merging of the worm into the winged insect. This might be seen well by those who care to see *Cossus ligniperda* dissected at different stages of its growth: when full fed, in the autumn, the wings are to be seen more than an inch in length, and wonderfully developed. One would expect to find this if the larvæ were dug up in the spring, as it passes so short a time in the pupa state; whilst in its first year I suppose there would be no trace of wings. True that *Stauropus fagi* started with jointed legs, but we may suppose that they too gain something in resemblance to the legs of the future moth, in common with the other parts which are undergoing a gradual modification, preparing them for their perfect condition. It seems that in losing the legs *Fagi* would lose a feature of resemblance to the perfect insect, which it would seem consistent for it to retain. I repeat this is but theory, and perhaps not worth thinking over; yet in this time of the year, when the parliament of insects is not sitting, one or other of our masters in Entomology might feel inclined to give a little information to those who, like myself, are still groping after truth, and sometimes blundering. I was mistaken in saying that the first pair of legs was simple: on closer examination with a lens I find that they, too, are jointed, though not prolonged. In all three pairs the tibia ends in a socket, into which fits obliquely a small foot, just as a leaf-bud fits into the swollen extremity of the twig. In the short pair there seems to be a further protuberance, like a solitary toe; but I cannot speak positively, as the larva I was examining to-day was dry and shrivelled—one that died as soon as it had drawn together two leaves with a few silken bars. To the naked eye the legs are smooth, but seen under a lens they are covered with small tubercles, from each of which starts a short hair; the roughness is just appreciable to the touch. Two of the legs broke off as I was handling the dried larva, and it was curious to observe how the setting of the legs, quite as much as their length, justifies the English name of lobster moth: the construction of the under part of the thorax, which can only be conveniently seen in a dead specimen, is wonderfully

crab-like. *Fagi* has a way, too, of throwing out its legs when irritated, just in the same way that a crab has of rearing itself up and hitting out with its claws to avoid being handled. Perhaps the coming summer may give me another opportunity of watching the transformation.—H. M. GOLDING BIRD; 45, Elgin Crescent, March 13, 1877.

"ASSEMBLING" IN GEOMETRÆ.—Mr. Cooper's interesting note, in the March number of the 'Entomologist' (Entom. x. 74), recalls to my mind two instances of a similar phenomenon which came under my own observation. At dusk on the 4th of July, 1874, my brother and I were engaged in "mothing" in one of the enclosures near Lyndhurst, when we noticed a number of *Hemithea thymiaria* hovering over a small black-thorn bush in a very peculiar manner. Investigation proved them to be all males; and a little further search, by aid of the lantern, revealed the cause of their proceedings in the shape of a fine female moth seated on a twig, and unmistakably "calling" the eager green suitors to her bower. The other case in point presented itself on the 23rd of May in the following year, the spot being the hedge-row surrounding "Three-acre Field," on the outskirts of Woodford Forest. A dozen or more male *Rumia cratægata* were fluttering over and around a bush, in which, after a considerable search, we found the female: she was not quite so bold in coquetry as the *Hemithea*, but had ensconced herself somewhat in the interior of the thicket. The only record of the observation of this habit among the *Geometræ* that I remember is that by Mr. C. G. Barrett (E. M. M. iv. 160). There the species was the beautiful *Phorodesma bajularia*; and he remarks that the female appeared to have as great a power of "assembling" as some of the *Bombyces*. I cannot help thinking, however, that the power must reside with many species, for in the majority of cases female moths fly little, if at all, before impregnation; and therefore it is only reasonable to suppose that they possess some subtle means of enticing their vagrant consorts. I have often taken specimens of various species off tree trunks, &c., in perfect condition, and with the *meconium* unexpelled, but which have still laid batches of fertile eggs. The males of *Boarmia roboraria* are generally worn to tatters, whilst the females, although capable of all maternal duties, may be found at rest, still retaining every

charm of primitive freshness. The power of attraction, which obviates the necessity of such female moths leaving their places of concealment before the important business of oviposition is to commence, must operate equally on all the males in the neighbourhood; and consequently we may conclude that the phenomenon termed "assembling" obtains in a large number of species to a greater or less degree. I shall be glad if Mr. Cooper's and the present note induce correspondents to send you accounts of any observations on the points referred to.—B. G. COLE; The Common, Stoke Newington, N., March 3, 1877.

ENTOMOLOGY IN CORNWALL.—In reply to Mr. Hodge's notice (Entom. ix. 274) of captures at St. Austell, I am afraid that many entomologists of that county are not aware that there is such a publication as the 'Entomologist,' *ergo* we have no record of their captures: for by an extract from an Address delivered at the Royal Institution of Cornwall, held in November last at Truro, it was stated that *Deiopeia pulchella* was "hitherto unrecognized in the county," and that the lecturer "anticipated some little difficulty in convincing every one that it was a genuine English moth." I wrote a reply (through the press), and pointed out to the lecturer that twelve captures in Cornwall were recorded during the years 1871 to 1875, and in reply (by letter) from him he states that he wrote to a gentleman at Bodmin, and another at Falmouth, both considered good authorities, neither of whom had seen, and I presume never heard of, any captures of this moth, which is the reason of its being supposed "hitherto unrecognized in the county."—G. C. BIGNELL; 9, Clarence Place, Stonehouse, Plymouth.

ACRONYCTA ALNI LARVA.—I have to record the capture last summer of one larva of this species feeding on hazel (*Corylus avellana*), which in time went to pupa. I hope to rear the imago in its season. This is, so far as I know, the third instance of its occurrence in this neighbourhood.—(Rev.) THOMAS E. CRALLAN, Hayward's Heath, Sussex, March 5, 1877.

GONOPTERA LIBATRIX IN ABERDEENSHIRE.—As I believe that *Gonoptera libatrix* is not common in the north of Scotland, I send this notice of its occurrence in Aberdeenshire. In the month of August I found ten of the larvæ of

this insect on a species of *Salix*; they were then nearly full fed, and all became pupæ in less than a fortnight—the last change occurring on the 13th August. I subsequently found two pupæ spun up among the leaves of the food-plant; they remained about three weeks in pupa, and, with one exception, emerged as perfect insects. I observed that the larvæ fed upon the light-green close-clinging leaves (near the top of the twig), which at a little distance they much resemble. Among other larvæ found on the same plants were those of *Dicranura vinula*; in changing to pupa those taken by me went under the earth in the breeding cage, making their cocoons of grains of soil.—L. DUNBAR; Wick, Caithness.

IDENTITY OF *HELIOTHIS SCUTOSA*, &c.—In the 'Entomologist' (Entom. x. 34) the Editor asks whether anyone has confirmed the identity of *Heliothis scutosa*, and other rare species, reported by Mr. W. H. Thornthwaite as captured near Norwich. To this question the latter gentleman asks me to reply. A few months ago Mr. Thornthwaite's announcement of the capture of these rarities came under my notice, and as my name was mentioned in the communication I, after some hesitation, wrote to him for further information, conveying, I fear, rather unpleasantly, my extreme scepticism about their identity. However, after his very courteous explanation of his mode of working, and the particulars of their capture, I was satisfied of the *bond fides* of the captures, made, as they were, in his absence, by friends totally unaware of their value, but working under his directions, and sending him up the specimens fresh and unsexed. The identity of the species in the case of *Heliothis scutosa* was settled by Mr. Thornthwaite's kindly sending me a specimen which had been taken in the same place last summer. It is abundantly distinct from our other species of *Heliothis*, being whitish, with the bands and large distinct stigmata dark gray. The gray fascia, before the dark marginal band of the hind wings, is also very distinct. After seeing it one feels astonished that any variety of *H. dipsacea* could ever be mistaken for it. I have not seen Mr. Thornthwaite's *Noctua flammata*, but hear from him that it has a black collar, which seems conclusive. There is no doubt of the identity of his *Heliothis armigera*, which I have seen.—CHAS. G. BARRETT; Pembroke, February 2, 1877.

PLODIA INTERPUNCTELLA: A NEW LOCALITY. — When

taking *Sciaphila Penziana* on the rocks at Witherslack, on the 7th July last, I saw a moth flying high over head, whose peculiar flight attracted my attention; I watched it for some time before it descended within reach of my net. Judge of my surprise when I looked at it. I first thought here is a new "knot horn," never once expecting to find an insect usually found in towns in such a place as Witherslack. I have always associated this species with warehouses and amongst dried fruit, &c. The specimen is a very large and finely-coloured example. Immediately after taking this species, I beat out of an old holly tree (*Ilex aquifolium*) one *Ephestia semirufella*, four *Acidalia inornata*, six *Eupithecia constrictata*, four *E. pumilata*, and sundry other species. The old tree seemed to have been a comfortable shelter for hordes of insects.—J. B. HODGKINSON; 15, Spring Bank, Preston, April, 1877.

GELECHIA ALBIPALPELLA—I succeeded last year in rearing a few specimens of this local species from the larvæ, which make conspicuous blotches on the young shoots of *Genistæ anglica* in the early part of June. About the middle of the month they become full grown, when they descend to the surface of the earth to undergo their changes. The imago appears in August, and is generally distributed over the forest at Loughton, but nowhere common. It is an exceedingly lively species, runs with remarkable celerity, and is boxed with difficulty.—WM. MACHIN, 22, Argyle Road, Carlton Square, E.

BRUCHUS RUFIMANUS.—In the first week of January of this year Mr. Challice, of the South Devon Nursery here, had occasion to open a bag containing a quantity of Seville long-pod beans, when he found that every one had little holes in them,—some one, some two, and some three. On examining the cause he saw several little beetles walking out of these holes. He gave me a quantity of these interesting, but injurious, little weevils.—J. PURDUE; Ridgeway, Plympton, Devon.

[The presence of *Bruchi* in the seeds of a large section of the *Leguminosæ* is but too well known. Contributions towards the life-histories of these and other destructive weevils will, as space permits, appear in these pages.—ED.]

EMMELESIA BLANDIATA.—In your summary of *Lepidoptera* (Entom. x. 8) you give *Emmelesia blandiata* as having

been taken in Glamorganshire, on my authority; but the locality given by me was Dolgelly, which is in Merionethshire. Perhaps you will kindly correct this.—H. JENNER FUST, jun.; Hill Cottage, Falfield, Gloucestershire, February 13, 1877.

HYBERNATION OF WASPS.—During the early part of December I discovered a remarkable instance of apparently gregarious hybernation of wasps in the upper room of a large building used for storing furniture. The furniture was covered with blankets to protect it from rain-water, which had found its way through the roof. On these blankets I found a number of wasps crawling in a half dormant condition. This set my curiosity on edge, and on searching the room further I found large numbers attached to some rough wood near the window. These wasps were so securely attached that at first sight they appeared to have their mandibles thrust right into the wood. I am indebted to Mr. Frederick Smith for naming some examples sent for identification. They are all females of *Vespa germanica*. Amongst the wasps were several *Vanessa Urticæ*.—G. B. CORBIN.

FOUNDATION OF A LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—The want of some organization for comparison of notes and the interchange of opinions amongst entomologists in the Liverpool district has long been felt. To supply this desideratum Messrs. Nicholas Cooke, Greening, Capper, Leather, and other well-known naturalists in that neighbourhood, had, a little time ago, a preliminary meeting, which resulted in the formation of the "Lancashire and Cheshire Entomological Society." The first meeting was held at the house of Mr. Samuel J. Capper, Huyton Park, when that gentleman was elected President, and Mr. W. H. Mountfield Hon.-Sec. The opening meeting of this promising Society was held on the 26th March in the lecture-room of the Borough Free Museum, Liverpool, which has been lent by the Corporation to the Society, for the purpose of holding its meetings. On this occasion the president read an interesting inaugural address. There is every reason to believe this Society will do good work in its neighbourhood, and give impetus to the study of Entomology. Already the roll of members has attained a considerable length.—ED.

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MELITÆA ATHALIA *var.* EOS, *Haw.*

By S. STEVENS, F.L.S., &c.



MELITÆA ATHALIA *var.* EOS (= PYRONIA, Hüb., Steph.).

THIS beautiful and probably unique *var.* of *Melitæa Athalia*, which is now in my collection, was captured at Peckham, near London, in June, 1803, by Mr. Howard; and record of it is given in the *old* Entomological Society's Proceedings, now in the library of the present Entomological Society of London, kindly presented to the Society by Mr. Frederick Smith. This specimen is figured in James Francis Stephens' 'Illustrations of British Entomology' (*Haustellata*), vol. i., pl. 4, figs. 1, 2 (1828), and copied into Humphreys and Westwood's 'British Butterflies,' pl. 8, figs. 13, 14; but as these works are now scarce it was thought desirable that a fresh figure should be given of it in the 'Entomologist.' At

the sale of the late Mr. Haworth's collection of insects, in 1834, it was bought by a Dr. Ashburton, whose collection was sold a few years afterwards, and then purchased by myself. The specimen is in beautiful preservation, and almost as fresh as when first captured.

"Loanda," Beulah Hill, Upper Norwood,
May, 1877.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY.

II.—LOCALITIES OF LEPIDOPTERA.

THE study of geographical distribution has recently become so important that some knowledge of the divisions of the world generally accepted by naturalists is indispensable to every one who wishes to form a clear idea of the relations of the natural productions of any country to those of another. Most naturalists now follow Dr. Sclater in dividing the world into six great regions of distribution; and Wallace, in his recent work on the geographical distribution of animals, has subdivided each of these into four. Although these subdivisions are frequently natural, the limits of others and their true relations to each other are still much disputed. But we will take the main regions separately, in the following order: Palearctic, Ethiopian, Indian, Australian, Nearctic, and Neotropical, enumerating Wallace's subregions, and adding such remarks as are likely to be most interesting to Lepidopterists. Those who desire further information will find Wallace's work well worth their careful study.

I. PALEARCTIC REGION.—Under this heading we include the whole of Asia-Europe (except the south-east of Asia); Northern Arabia; and North Africa as far as the Sahara. This region, though poor in species, especially as compared with its extent, is one of the most interesting, partly because its productions are better known than those of other regions, and partly on account of the numerous and important problems connected with their distribution. It is now believed that the bulk of the original fauna of the Old World originated in the north, from whence it was swept south of

the great central ranges by the Glacial period, subsequent to which it has gradually returned, chiefly from Asia. The four subregions admitted by Wallace are:—1. Central and North-European, south to the central ranges, and east to the Caspian, and the valley of the Irtysh; 2. Mediterranean, south to the Sahara, and east to the frontiers of India; 3. Siberian, including all northern Asia, south to Turkestan, Thibet, the desert of Gobi, and the Amoor; 4. Mantchurian, including Japan, and the country east of Gobi, and south of the Amoor, as far as the Nanlin mountains, south of the Yang-tse-kiang. The latter district is interesting, on account of the mixture of East Indian and North American forms which there mingle with ordinary European species. Many groups extend much farther north in the east of Asia than in the west, owing to the different conformation of the country. The fauna of Central Asia is comparatively little known at present, and many insects far from uncommon in their own localities fetch very high prices; while others, occurring in localities very rarely visited, and almost inaccessible to Europeans, are absolutely unattainable. Besides the large general works on the European Fauna by Esper, Hübner, Ochsenheimer and Treitschke, and Herrich-Schäffer, the principal works on the *Lepidoptera* of the Palæarctic region (not already mentioned, or confined to British species) are those by Wallengren (for Sweden), Rambur (for Andalusia), Snellen (for Holland), Dubois (for Belgium), Eversmann (for South Russia), Lucas and Oberthur (for Algeria), Erschoff (for Turkestan), and Ménétriés and Bremer (for the Amoor). Local lists of the *Lepidoptera* of almost every country, and many small districts in Europe have been published either separately or in magazines.

II. ETHIOPIAN REGION.—This includes Africa, south of the Sahara, and the southern portion of Arabia. Wallace divides it into subregions as follows:—1. East African, and Central; 2. West African; 3. South African; 4. Malagasy. The first is by far the largest, the second taking from it only a broad strip of the west coast, between the rivers Gambia and Congo. The South African region extends on the west coast north to Welwitsch Bay, and on the east to Mozambique. The fourth includes Madagascar and the adjacent islands, which have a peculiar fauna of their own.

The fauna of Africa has an isolated character, being cut off by deserts from the northern continents; and though now richer than any other part of the world in large mammals, its *Lepidopterous* fauna is less rich than might be expected, though chiefly consisting of peculiar forms. It has considerably more affinity with that of India than with that of Europe. The Madagascar Fauna is specially interesting, but rather from the peculiar manner in which certain forms common to Madagascar and the main land have diverged from each other in different ways than from the number and beauty of the species not found on the continent. Several species, once believed to be confined to Madagascar, are now known to occur in East Africa; and it is probable that others will be discovered when that country is better known. The more abundant and widely distributed species of African *Lepidoptera* have lately become comparatively common in collections, owing to the large numbers sent home by different professional collectors; but insects from any little visited part of Africa, or species remarkable for their size and beauty, which rarely come in numbers, still command high prices at all times. The only systematic works specially on the *Lepidoptera* of the African region are those by Trimen on the butterflies of South Africa (now out of print); the papers by Wallengren on the *Lepidoptera* of Caffraria, in the Swedish Transactions; and Boisduval's '*Lépidoptères de Madagascar*.' *Lepidoptera* are, however, treated of in various scientific voyages, such as Peter's '*Reise nach Mossambique*' and Van der Decken's '*Reisen in Ost-Afrika*.'

III. INDIAN REGION.—India, South China, and South-Eastern Asia generally; the Philippines, Formosa, and the three great islands of Java, Sumatra, and Borneo. This district is very rich in *Lepidoptera*, and its productions are comparatively well known; but there are no special works devoted to them which need be mentioned here, as any of importance are limited to isolated groups. Notwithstanding the number of Europeans in this region, good collections are less frequently received from it than might be supposed; common Indian butterflies are always to be had, but frequently in poor condition; and collections from the interior Himalayas, or from any infrequently visited portion

of this region, are always interesting and valuable. A great number of peculiar forms are confined to the Indian region, while others show more or less affinity with Europe, Africa, or Australia. It is to be noted that Indian specimens of insects common to India and Europe, or North Asia, are generally considerably smaller in India, owing, perhaps, to the more rapid development of the larvæ in a hot climate. Wallace subdivides this region into subregions as follows:—1. Hindostan, or Indian subregion; 2. Ceylon and South Indian; 3. Himalayan, or Indo-Chinese; 4. Indo-Malayan, including the Malayan Peninsula; Borneo, Java, and Sumatra. The divisions explain themselves; and as their correctness is much disputed, we will not further notice them.

IV. AUSTRALIAN REGION.—Includes Celebes, New Guinea, Australia, and New Zealand, the Polynesian Archipelago, and all the islands between or near those already mentioned. The affinities of this region are chiefly with the last, though many of the characteristic Indian forms are wanting. On the whole, the fauna is poor, though some groups (for example, *Papilio*) attain their maximum of size and beauty here. Australia itself is more remarkable for peculiar forms of *Lepidoptera-Heterocera* than for its butterflies. Wallace divides the Australian region into four subregions as follows:—1. Austro-Malayan Subregion (*Papua, Moluccas, &c.*); 2. Australian; 3. Polynesian; 4. New Zealand. Butler's 'Catalogue of Lepidoptera of New Zealand,' forming part of the 'Zoology of the Voyage of the Erebus and Terror,' is the only general work on the *Lepidoptera* of any part of the Australian region. Except from South Australia, specimens are only obtainable casually from this part of the world, when the islands of which it consists happen to have been recently visited by collectors.

V. NEOTROPICAL REGION.—Comprises South and Central America, the West Indies, and a great part of Mexico. This region is probably by far the richest in *Lepidoptera* of any in the world; it produces more than half the known butterflies, and whole families are almost if not entirely confined to it. It is said that over 2000 species of butterflies are met with in the valley of the Amazon alone. Wallace divides it into subregions as follows:—1. Tropical South American or Brazilian Subregion; 2. South Temperate,

or Chilian; 3. Tropical North American, or Mexican; 4. Antillean. The Chilian Lepidopterous fauna is very peculiar, so closely resembling that of California, and even of Europe, that Chili and California might almost be regarded as outlying portions of the Palæarctic region. Whether the Pampas of South America are properly classed with Chili, I much doubt; but we require more extended observations to confirm or modify Wallace's subregions. Many insects are common throughout Tropical America, and are always easily to be obtained; others are more local, and are not always to be procured. Insects from Chili, Buenos Ayres, and even the West Indies are frequently more difficult to obtain than those of other parts, probably because their more limited fauna offer less attractions to naturalists. Only five of the West Indian Islands—Cuba, Haiti, Porto Rico, Jamaica, and Trinidad—have been at all properly worked; and insects from the two former are very scarce in collections. The fauna of Trinidad scarcely differs from that of the opposite coast of South America. There are no systematic works on the *Lepidoptera* of this region, apart from detached papers, if we except the Lepidopterous portion of large books on Cuba and Chili; but a great number are figured in the large illustrated works devoted to *Lepidoptera* generally, such as Cramer's 'Papillons Exotiques,' Hewitson's 'Exotic Butterflies,' Hübner's 'Sammlung Exotischer Schmetterlinge' and 'Zuträge,' Herrich-Schäffer's 'Aussereuropäische Schmetterlinge,' Felder's 'Reise der Fregatte Novara,' &c.

VI. NEARCTIC REGION, OR NORTH AMERICA.—This region is much poorer in *Lepidoptera* than the last, and is so closely related to the Palæarctic region that but for conclusions drawn from other natural groups it could scarcely be separated from it. Wallace divides it into four subregions, as follows:—1. Western, or Californian Subregion; 2. Central, or Rocky Mountain Subregion; 3. Eastern, or Alleghany Subregion; 4. Subarctic, or Canadian. All these districts are now being well worked, either by resident Lepidopterists or by scientific surveys. Their productions are usually not difficult to obtain; those from the south-western and southern states being generally the most prized and the rarest. The principal works on this region are Abbot and Smith's '*Lepidoptera of Georgia*,' Boisduval and Leconte's '*Lepidoptères de l'Amerique Sep-*

tentrionale,' and Edwards' 'Butterflies of North America,'—a fine illustrated book now in progress. A large amount of information relating to North American *Lepidoptera* appears every year in the publications of the numerous entomological and other scientific societies now existing in the United States and Canada.

Zoological Department, Royal Dublin Society,
May, 1877.

MELANISM IN LEPIDOPTERA

BY NICHOLAS COOKE.

BEING a man of peace, it is out of my way even to have a battle of words with Dr. Buchanan White on this subject; and I was much pleased on reading his able communication in this month's 'Entomologist,' to find that he has rendered it quite unnecessary. I agree with every word he has written except, in spite of his positive assertion, that natural selection is not sexual selection. I believe—and I think every person of common sense believes—sexual selection is a most natural selection. I also think he is wrong in saying that "the occurrence of pale forms on chalk and other light-coloured formations is brought about by natural selection, not by the geological formation." If natural selection exercises such a potent influence over the colours of *Lepidoptera*, we should have no dark species at all on the chalk. Since my paper appeared I have bred two dark varieties of a light-coloured species from the chalk. I regret that I am not at liberty to mention the name of the species; the larvæ were sent to me when young by a kind friend, and I fed them on an oak tree in my garden in a leno sleeve. I never saw or heard of a dark specimen of the species before last year, and it puzzles me to account for them, as other dark specimens have been procured from the same wood on the chalk. Had it not been so, I should have concluded that the soot on my tree was the cause of the aberration; but it is not so, for it is evident there is a dark race of this particular species existing on the chalk a long distance from any manufacturing district.

I have also lately become acquainted with the fact that *Tephrosia biundularia* of the dark form, for which Dr.

White proposes the name of *Delamerensis*, occurs in the "black district" of Staffordshire—in Burnt Wood—not far from which an immense quantity of smoke is produced by the manufacture of iron and pottery.

When I read my paper on "Melanism" before the Lancashire and Cheshire Entomological Society, I was under the impression that both Dr. White and Mr. Birchall wished to teach us that natural selection, or the survival of the fittest, was the *cause* of Melanism. It now appears I was either mistaken or else Dr. White has come round to my views, for, after telling us what natural selection does for *Lepidoptera*, he asks the question, "What is the exciting cause?" This is just the point. I admit that when a variety has been produced—no matter by what means—it becomes hereditary. If circumstances favour the reproduction of the variety, it may be intensified generation after generation; or, if it appears under unfavourable circumstances, it may revert to the type form in a few generations—but this is all that natural selection has to do with Melanism. I suggested two causes which I imagine are at work in producing dark varieties, and quite agree with Mr. Prest that we must look further.

When I mentioned these I was well aware that it was only an attempt on my part to account for the dark varieties in two or three species, and I know to my great pleasure and wonder that there are extraordinary dark varieties produced in Scotland. These cannot have been caused by smoke or chemicals, but they are, as far as my experience goes, produced in black bog or peat soil, which I suppose contains a large amount of carbon; and this may have the same effect on the caterpillars, through the tissues of the food-plants containing more carbon than in other situations, as when the caterpillars eat the carbon in the form of soot along with their food. I was at school at York, and have been there since. That city is, I think, as "the crow flies," not more than thirty-miles from Leeds, the blackest town in Yorkshire. Why, one can hardly distinguish a white sheep from a black one near Leeds, owing to the quantity of soot that falls on the pasture. Smoke from the district around Leeds will be carried by the wind at least sixty miles; and if Mr. Prest will put on a pair of white trowsers and walk through a

field of hay-grass outside the walls of York, after a few days of dry weather and westerly winds, he will find his legs in such a state that he will be glad to get into a cab and drive home rather than walk through the streets: so that although the country immediately around the city is purely agricultural, yet I am satisfied there is a sufficient amount of soot deposited on the plants to affect the colours of the *Lepidoptera*. I am the more inclined to think this is one great cause of dark varieties because a gentleman of high standing in this district, who either is or was a calico-printer, has said that he could produce varieties of moths by giving the larvæ chemicals along with their food. If he sees this and would give us his experience, it might do more towards arriving at some knowledge of the cause of Melanism than any amount of papers written on the subject by those who have not made any such experiments.

I was much pleased with the observations of Mr. E. K. Robinson, and think it is highly probable that other varieties are caused by various kinds of food.

With regard to anal appendages, the printers made me say what I never intended—that the sexual organs of *Cerastis vaccinii* differ little from those of *C. spadicea*. I said there was no difference. No one present at the meeting could perceive any difference either between *C. vaccinii* and *C. spadicea*, or between *Acronycta psi* and *A. tridens*. The two latter species have such very different larvæ that they must be considered distinct, for we cannot have a better specific character; but until I know that the larva of *C. vaccinii* differs from that of *C. spadicea*, I shall certainly consider them mere varieties of one species. I shall be much interested in Dr. White's investigations which are to appear in the Linnean Transactions.

Gorsey Hey, Liscard, May 8, 1877.

ANDRENA FEROX.—In the March number of the 'Entomologist' (Entom. x. 62) Mr. F. Smith refers to *Andrena ferox* as having been taken by me at Guestling. Will you allow me to state that this specimen, which I had the pleasure of submitting to him for identification, was taken not by myself, but by the Rev. E. N. Bloomfield.—E. A. BUTLER; University School, Hastings, March 1, 1877.

ON THE SPIDERS OF SCOTLAND; WITH A LIST OF SPECIES.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., C.M.Z.S.

PREVIOUS to the year 1858 no collector appears to have paid any attention to the *Araneidea* of Scotland. In that year Mr. James Hardy (then of Penmanshiel, now of Old Cambus, by Cockburnspath, Berwickshire) published the results of occasional attention paid to this order, while collecting other objects of Natural History. The spiders collected then by Mr. Hardy were all determined, and one species which appeared to be new to science (*Walckenaëra Hardii*) was described, by Mr. John Blackwall (Ann. and Mag. N. H., 2nd ser., vi., p. 340); while, in the 'Proceedings of the Berwickshire Natural History Field Club,' vol. iv., pp. 92—96, 1858, Mr. Hardy, under the title of "List of Berwickshire Spiders," gave a complete list of all his captures up to that time, amounting to seventy species, distributed among twenty-two genera. Three years after this,* a few weeks tour in Scotland (in June and July, 1861) enabled me, in spite of a great deal of wretched weather, to collect examples of eighty-three species, belonging to twenty-one genera. Thirty-seven of these species were additions to those enumerated in Mr. Hardy's list, thus bringing up the number of Scotch spiders to one hundred and seven. Five years after this (in 1866) I received several small collections of spiders from Mr. Morris Young, of Paisley, by whom they were found in that neighbourhood: of these only those either new to science, or else previously unknown as British, have, up to this time, been recorded. From 1866 to 1871 no one seems to have paid any further attention to spiders in Scotland; but from the latter date up to the end of 1874 repeated and extensive collections were most kindly forwarded to me from Berwickshire and the Border-land by Mr. Hardy. The results of my examination of these collections were published in the 'Proceedings of the Berwickshire Natural History Field Club,' vol. vii., pp. 307—323, 1875; the greater part of the new species added to the British list having been previously

* See "Sketch of an Arachnological Tour in Scotland in 1861; with a List of Scotch Spiders." By the Rev. O. P. Cambridge. 'Zoologist,' 1862, pp. 6041—6051.

described and figured in the 'Linnean Transactions' (xxviii.). About the same time several collections were sent to me from the neighbourhood of Aberdeen and other parts of Scotland, by Mr. J. W. H. Traill, of the University, Aberdeen. The new species contained in these collections were also described and published by myself in the 'Linnean Transactions' (xxviii.), and a general list was published by Mr. Traill in the 'Scottish Naturalist,' vol. ii., pp. 24, 25, and 300. This list contained one hundred and thirty-three species belonging to twenty-three genera. More lately still I have received some small collections made in the neighbourhood of Castle Douglas, N.B., from Mr. W. D. R. Douglas, of Orchardton; and in the vicinity of Glasgow, from Mr. H. C. Young, of Port Dundas, in that city.

The time appears now to have arrived for summarising the results of all the lists and collections referred to; and this task I have attempted in the present list. After the name of each species the localities in which it has been found are given, and after each locality the initials of the collector are added within parentheses. The names to which these initials refer will be found in a note; and in another note is a reference to those papers and publications in which the various spiders now tabulated, or any of them, have been noticed.

The nomenclature and classification adopted are mainly those contained in a "Systematic List of British Spiders" (Trans. Linn. Soc. vol. xxx. pp. 319—334). For synonyms of such spiders as were known up to the time of their publication, reference must be made not only to the works of Mr. John Blackwall, and the papers of the present writer in the 'Linnean Transactions,' &c., but also to the important works of Dr. T. Thorell, of Upsala (*vide* note 1, *post.*).

The number of species contained in the subjoined list, as the result of the different collections and lists above mentioned, is two hundred and thirteen, belonging to fifty-three genera, and distributed among nine families. It should be mentioned, however, that the apparently great increase of genera represented in the present list is mainly due to the generic limits adopted by Mr. Blackwall, and by myself in earlier British lists, having been considerably altered.

It cannot be considered that the number of Scottish

spiders here recorded is anything like the number that exists; even that family most numerously represented (*Theridiides*) has, there can be little doubt, many species yet to be discovered, although comprising, as it does already, more than half the known Scottish spiders. Three genera alone of this family monopolise one hundred and two species:—*Neriene*, thirty-seven; *Walckenaera*, twenty-eight; and *Linyphia*, thirty-seven: and it is to these three genera that we may yet expect the most numerous additions to be made by future collectors, especially as the known *British* species of these three genera amount to two hundred.

It is to be hoped that the present summary of the recorded Scottish spiders may induce some of the numerous entomological collectors to pay more attention to them, and so to furnish ere long materials for a supplement to the list subjoined.

The following analysis furnishes a key to the distribution of the species among the different families and genera recorded:—

Fam. *Dysderides*.

Gen. *Harpactes*, 1.

„ *Segestria*, 1.

„ *Oonops*, 1.

Fam. *Drassides*.

Gen. *Gnaphosa*, 1.

„ *Micaria*, 1.

„ *Phrurolithus*, 1.

„ *Prosthesima*, 2.

„ *Drassus*, 5.

„ *Clubiona*, 10.

„ *Cheiracanthium*, 2.

„ *Anyphaena*, 1.

„ *Agræca*, 1.

„ *Hechaerge*, 1.

Fam. *Dictynides*.

Gen. *Dictyna*, 1.

„ *Amaurobius*, 2.

Fam. *Agelenides*.

Gen. *Cœlotes*, 1.

„ *Tegenaria*, 1.

„ *Textrix*, 1.

Gen. *Cryphoea*, 1.

„ *Hahnia*, 1.

Fam. *Theridiides*.

Gen. *Pholcomma*, 1.

„ *Theridion*, 6.

„ *Nesticus*, 1.

„ *Phyllonethis*, 1.

„ *Euryopsis*, 1.

„ *Asagena*, 1.

Gen. *Neriene*, 37.

„ *Walckenaera*, 28.

„ *Pachygnatha*, 2.

„ *Tapinopa*, 2.

„ *Linyphia*, 37.

„ *Ero*, 1.

Fam. *Epeirides*.

Gen. *Meta*, 3.

„ *Tetragnatha*, 1.

„ *Cyrtophora*, 1.

„ *Singa*, 3.

„ *Cercidea*, 1.

„ *Zilla*, 2.

<i>Gen. Epeira</i> , 7.	<i>Gen. Trochosa</i> , 5.
Fam. <i>Thomisides</i> .	„ <i>Lycosa</i> , 8.
<i>Gen. Xysticus</i> , 10.	„ <i>Tarantula</i> , 2.
„ <i>Philodromus</i> , 3.	Fam. <i>Salticides</i> .
„ <i>Thanatus</i> , 1.	<i>Gen. Epiblemum</i> , 1.
Fam. <i>Lycosides</i> .	„ <i>Heliophanus</i> , 1.
<i>Gen. Ocyale</i> , 1.	„ <i>Euophrys</i> , 3.
„ <i>Dolomedes</i> , 1.	„ <i>Attus</i> , 2.
„ <i>Pirata</i> , 2.	„ <i>Salticus</i> , 1.
9 Families.	53 Genera.
	213 Species.

NOTE 1.—The works referred to above for references as to synonyms, descriptions, figures, and other particulars, are a ‘History of the Spiders of Great Britain and Ireland,’ by John Blackwall, Esq., Lond., 1859–64; with some other papers, subsequently published by the same author, in ‘Annals and Magazine of Natural History, 1864–72. Also papers on British spiders, by the Rev. O. P. Cambridge, in ‘Transactions of the Linnean Society,’ xxvii., pp. 393–463, pls. liv.—lvii.; xxviii., part 3, pp. 433–458, pls. xxxiii.—xxxv.; and part 4, pp. 523–555, pls. xlv., xlv.; ‘Journal of the Linnean Society,’ vol. xi., pp. 530–547, pls. xiv., xv.; ‘Proceedings of the Zoological Society,’ 1873, pp. 747–769, pls. lxx., lxxvi.; and ‘Synonyms of European Spiders,’ by Dr. T. Thorell, Upsala, 1871–73, pp. 1–644.

NOTE 2.—The names referred to under the various initials appended to the localities mentioned in the list are as follows:—

J. H. = Mr. James Hardy, of Old Cambus, Berwickshire.

O. P. C. Rev. O. P. Cambridge, of Bloxworth, Dorset.

M. Y. Mr. Morris Young, of Paisley.

J. F. M. Rev. James Francis Montgomery, Dean of Edinburgh.

J. W. H. T. Mr. J. W. H. Traill, University, Old Aberdeen.

W. D. R. D. Mr. W. D. Robinson-Douglas, of Orchardton, near Castle Douglas, N.B.

H. C. Y. Mr. H. C. Young, of Port Dundas, Glasgow.

LIST OF SCOTCH SPIDERS.

Fam. DYSDERIDES.

HARPACTES, Templeton, = *Dysdera*, Bl., *ad partem*.

Harpactes Hombergii, Scopoli. Berwickshire (J. H.); Muchalls, Dunkeld (J. W. H. T.); Trosachs (O. P. C.); Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

SEGESTRIA, Latr.

Segestria senoculata, Linn. Cheviots (J. H.); generally distributed in Aberdeen district (J. W. H. T.); Trosachs, Pentlands, and Loch Rannoch (O. P. C.); Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

OONOPS, Templ.

Oonops pulcher, Templeton. Berwickshire (J. H.); near Aberdeen, and Dunkeld (J. W. H. T.).

Fam. DRASSIDES.

GNAPHOSA, Latr., = *Drassus*, Bl., *ad partem*.

Gnaphosa Anglica, Cambr. Berwickshire (J. H.).

MICARIA, C. L. Koch, = *Drassus*, Bl., *ad partem*.

Micaria pulicaria, Sund. = (*Drassus nilens*, Bl.) Arthur's Seat, Edinburgh (O. P. C.); near Aberdeen and Dunkeld (J. W. H. T.); Berwickshire (J. H.).

PHRUIROLITHUS, C. L. Koch, = *Drassus*, Bl., *ad partem*.

Phrurolithus festivus, C. L. Koch, = (*Drassus propinquus*, Bl.) Arthur's Seat (O. P. C.).

PROSTHESIMA, L. Koch, = *Drassus*, Bl., *ad partem*.

Prosthesima Petiverii, Scop. = *Drassus ater*, Bl. Castle Douglas (W. D. R. D.); Berwickshire (J. H.).

P. nigrita, Fabr. = *Drassus pusillus*, Bl. Cheviot Hill (J. H.); Arthur's Seat (O. P. C.).

DRASSUS, Walck. = *Drassus*, Bl., *ad partem*.

Drassus cupreus, Bl. Berwickshire (J. H.).

D. lapidicolens, Walck. Berwickshire (J. H.); Ballater and near Aberdeen (J. W. H. T.); Castle Douglas (W. D. R. D.).

D. troglodytes, C. L. Koch. Berwickshire (J. H.); Paisley (M. Y.); near Aberdeen (J. W. H. T.).

D. sericeus, Bl. Arthur's Seat (O. P. C.).

D. sylvestris, Bl. Berwickshire (J. H.).

CLUBIONA, Latr. = *Clubiona*, Bl., *ad partem*. = *C. epimelas*, Bl.

Clubiona pallidula, Clerck. = *C. epimelas*, Bl. Castle Douglas (W. D. R. D.); Muchalls (J. W. H. T.); Inversnaid, Loch Lomond (O. P. C.).

C. brevipes, Bl. Pentland Hills (O. P. C.); Berwickshire (J. H.).

C. terrestris, Westr. = *C. amarantha*, Bl. Berwickshire (J. H.); Pentlands (O. P. C.); Aberdeenshire; Keith (J. W. H. T.).

C. reclusa, Cambr. Berwickshire (J. H.); Braemar (J. W. H. T.); near Glasgow (H. C. Y.).

C. grisea, C. L. Koch. = *C. holosericea*, Bl. Berwickshire (J. H.).

C. trivialis, C. L. Koch. Pentlands (O. P. C.); East Ross and Orkneys (J. W. H. T.).

C. pallens, C. L. Koch. = *C. diversa*, Cambr. Cheviots (J. H.); Dunkeld (J. W. H. T.); Paisley (M. Y.).

C. holosericea, Degeer = *C. deinognatha*, Cambr. Near Aberdeen (J. W. H. T.); Paisley (M. Y.).

C. cærulescens, L. Koch. = *C. voluta*, Cambr. Aberdeenshire (J. W. H. T.).

C. comta, C. L. Koch. Inverurie, Aberdeenshire, and Dunkeld (J. W. H. T.); Berwickshire (J. H.); Paisley (M. Y.).

CHEIRACANTHIUM, C. L. Koch. = *Clubiona*, Bl., *ad partem*.

C. nutrix, Westr. Near Aberdeen (J. W. H. T.). The spider recorded as *Clubiona erratica* from Loch Rannoch (O. P. C.) is probably of this species.

C. carnifex, C. L. Koch. Dunkeld (J. W. H. T.).

ANYPHÆNA, Sund. = *Clubiona*, Bl., *ad partem*.

Anypheana accentuata, Walck. Pease Dean (J. H.); Dunkeld (J. W. H. T.); Berwickshire (J. H.).

AGRŌECA, Westr. = *Agelena*, Bl., *ad partem*.

Agrœca brunnea, Bl. Berwickshire (J. H.).

HECAERGE, Bl.

Hecæerge maculata, Bl. = *H. spinimana*, Bl. Berwickshire (J. H.); Aberdeen (J. W. H. T.).

(To be continued.)

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 124.)

Fig. 66.—*NEUROTERUS LANUGINOSUS*.

66. *Neuroterus lanuginosus*, Gir.—This beautiful gall is found on the under side of the leaves of *Quercus cerris*, both on stubs and on old trees. This spangle gall is attached to the leaf by means of a short pedicel, and is not visible on the upper side of the leaf; it is spherical, with a diameter of from 4 to 6 millimetres, depressed in its young state; but later on it becomes 3 to 4 millimetres in height, so that the upper and under surfaces become more or less protuberant. The whole surface of the beautiful red gall is thickly covered with long, white, silky hairs, which, particularly in immature galls, are arranged radiately on the upper side of the gall; and those hairs which emanate from the papilla at the top are yellowish brown and very thickly arranged. It is of a very tender, loose texture in the interior, and contains a larva-cell. The gall falls in October, but does not attain maturity till a month afterwards. Dr. Giraud obtained the fly at the end of March.—G. L. MAYR.

Theinquillines and parasite, which Dr. Mayr has bred from this Turkey oak and exotic gall, are *Synergus variabilis*, Mayr, *Sapholytus Haimi*, Mayr, and *Callimome abdominalis*,

Boh., all of which appeared in the spring of the second year.
—E. A. FITCH.

67. *Neuroterus ostreus*, Hart.—

This small gall appears in July at the side of the midrib on the under side of the leaves of *Quercus sessiliflora*, *Q. pedunculata*, and *Q. pubescens*. At first it is enclosed in a membranous covering, which later on splits into two similar flap-like parts and dries up, whilst the gall increases in size, and generally



Fig. 67.—*N. OSTREUS*.

reaches an oviform, rarely spherical, shape, with a longitudinal diameter of 3·8 millimetres. It is smooth, hairless, at first green or yellow, but subsequently becomes, especially when exposed to the sun, covered with beautiful little red or violet circular patches or spots, which are either placed in diagonal rows, crowded together, or tolerably evenly scattered; it is moderately hard, and contains a relatively large larva-cell without an inner gall. The galls fall in August and September, and leave the envelopes on the leaves. Dr. Giraud obtained the producers in autumn, after he had collected the fallen galls.
—G. L. MAYR.

The galls of this species have occurred in almost every locality in England and Scotland where looked for. I have found them to vary greatly in size, shape, and colour; but this is partly owing to the influence of parasitism. However, I think it is doubtful whether we have not more than one closely-allied species yet unrecognised. Giraud, who was the first to describe the insect, possessed a dozen specimens, "some obtained towards the middle of October from galls collected in great quantity towards the end of September, and others captured on the 28th of October upon the buds of oak, where they were occupied in laying their eggs." With Miss E. A. Ormerod a specimen emerged on September 7th; and I have bred the gall-makers in December. Mr. Müller, besides breeding specimens in the second week of October, also obtained the *Neuroterus* in May and June from hybernated galls (Ent. Mo. Mag vii. 209). This last fact is opposed to Giraud's autumn egg-laying; but it is possible that Müller's summer-bred specimens appertained to *Synergus*, as Dr. Mayr

speaks of *S. Tscheki* as emerging commonly from this gall in June of the second year; *Synergus tristis*, Mayr, occurring somewhat earlier in the spring. Hartig described (Germ. Zeit. f. Ent. iii. 342) *Aulax syncrepidus* as a dweller in the gall of this species, but said nothing as to the time of its appearance.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ARGYNNIS LATHONIA AT BROADSTAIRS.—It may be interesting to your readers to know that on the 29th of August, 1876, at Broadstairs, I captured a specimen of *Argynnis Lathonia*. The specimen was in very fair condition.—A. F. HERNAMAN; St. Edward's, Oxford, May 1, 1877.

PETASIA NUBECULOSA.—I have been fairly fortunate in capturing *Petasia nubeculosa* this season in its old locality, Rannoch. During the time it was out I found about a couple of dozen. Had it not been for the severity of the weather I should have probably got more. The mountains are now covered with snow, which I expect will not melt this year. Other *Lepidoptera* are scarce; there is no sign of *Fidonia carbonaria*, or the usual visitors, as yet.—DUNCAN ROBERTSON; Camghouran, Rannoch, May 17, 1877.

OCCURRENCE OF BREPHOS PARTHENIAS AT LEA BRIDGE.—While walking along the River Lea, near Clapton, on the 15th of April, my attention was drawn to an insect which alighted on the path a few yards in front of me. I at first thought it was a hibernated specimen of *Vanessa urticae*; but on proceeding to the spot to my great surprise I found it to be a large male specimen of *Brephos parthenias*. Having neither net nor boxes at the time, I managed to get the insect into my hat, and succeeded in bringing it home. I have no recollection of this species occurring so near London before, especially in a marshy district. I saw this species unusually common in West Wickham Wood last Easter Monday.—W. J. HARPER; 37, Mansfield Street, Kingsland Road, April 18, 1877.

BREPHOS NOTHA.—In spite of the lateness of the season, in which little has put in an appearance in these parts beyond an odd hibernated *Vanessa polychloros* and *Gonepteryx rhamni*, our pretty spring friend *Brephos notha* has

been fairly true to its appointment. I saw one or two flying at a tantalisingly safe height one chance sunny morning at the end of last month; and my boys caught a couple of very perfect specimens on the 7th of April flying over young birch trees.—[Rev.] J. CAVE-BROWNE; Detling Vicarage, Maidstone, April, 1877.

TINEINA IN HACKNEY MARSHES.—*Coleophora therinella*.—I have great pleasure in recording the occurrence of this scarce species on Hackney marshes. During the winter months I have found among grass at the roots of thistles small cases containing hybernating larvæ of these insects, which are now feeding freely on growing thistles. They have lately considerably lengthened their cases, and appear to be doing well; but experience has proved this species to be very subject to attacks of ichneumons, and few of them reach the imago state. *Elachista poella*, which has been scarce for several years, has this spring appeared in tolerable numbers; and the pupæ may still be collected in the sedge leaves on the marshes, or the moths swept from the plants early in June.—WM. MACHIN; 22, Argyle Road, Carlton Square, E., May 15, 1877.

TINEINA REARED IN 1876.—*Depressaria propinquella* furnishes work for the collector very early in the year, and is to be found everywhere amongst *Epilobium montanum*. About Preston and Witherslack it mines the leaves, and compels any who seek it to get wet feet. A little later, in the same plant and others of the family, *Laverna ochraceella* occurs, but appears to feed first in the stem, and afterwards mines the leaves near the midrib, spinning up in a white cocoon. This is contrary to former observation, and I shall be glad of correction if wrong. There is one old weather-beaten buckthorn tree (*Rhamnus catharticus*) on Whitbarrow which abounds with *L. rhamniella*: every bud has indications of a tenant, and plenty may be bred with ordinary care. The bare exposed rock on which this tree grows leads me to remark what various conditions suit many insects; beneath it, on plants amongst the shingle, *Coleophora albitarsella* feeds, and must have some difficulty in flying at all in some seasons, as nearly every wind would disturb and carry weak-winged insects away with it. *Elachista apicipunctella* is a marvel: it is very difficult to find; for

three years it has been assiduously sought in its locality; and I cannot say much about its habits, having only bred about six. The grass in which it must feed is covered with rotting willow herbs and other plants; it is bad to find so early in the year as April. The larva of *E. cinereopunctella* first delighted me this year; it is beautifully spotted with red; it feeds along with *E. gleichenella* at Grange. No one who collects should fail to breed *E. luticomella* and *E. atricomella*; but they both appear to delight in destroying their brilliancy when they emerge. No caught specimen I ever saw could compare with those bred. *E. humilis*, which I think is not very well known, feeds in a long stiff grass in very wet places in Brockhole's Wood; the larva is very light yellow, feeding downwards during March and April, and emerging in the middle of June—although a continuous succession of broods of larvæ appear to be always mining in the grass. *E. adscitella* and *E. megerella* must have more attention paid to them, as they appear to mine the same grass and are very much alike, unless there is a larval difference. *E. dispunctella*, like *E. humilis*, has, I believe, never been bred before; and, as only one larva was found, very little can be said about it. This one was taken on June 5th, in what appeared a dry stem of *Festuca ovina*, and was quite full fed; it was of a dirty unicolorous brown; it emerged July 8th. The right time for taking *Cemistoma Wailesella* is when the flower of *Genista tinctoria* is just appearing, say the 27th of June; its mine strongly reminded me of *Nepticula septembrella*, almost a black blotch.—J. H. THRELFALL; Preston.

THE "HORNS" OF CATERpillars.—"What are they for?" This question was asked me one day, and I was obliged to confess frankly, "I do not know." I am alluding especially to the horns that "adorn" the group of *Sphingida*, because a function—it may, indeed, be a wrong one—has been assigned to the appendages behind the head of the larvæ of *Papilio Machaon*, and the caudal ones of *Dicranura vinula*. I have searched many books on Entomology, but have never been able to find anything satisfactory on the subject. That they are, however, designed for a definite object cannot be doubted. The first thought that seems to suggest itself is that like the horns of *P. Machaon* and *D. vinula* they are intended as a means of defence for these most helpless

creatures, by giving an aspect of ferocity, which may deter their foes from attacking them; a similar purpose being attributed to the eye-like spots of the larvæ of *Porcellus* and *Elpenor*. Doubtless amongst the contributors to the 'Entomologist' many can afford some useful information. Again, will someone say what are the protuberances of the caterpillars of the *Cuspidatæ*?—J. ANDERSON, jun.; Chichester.

OAK-GALLS: *APHILOTHRIX CORTICIS*, L.—These galls are of some interest from their presence not having been yet recorded in Britain. About the beginning of March I found specimens on an oak in the neighbourhood of Isleworth agreeing so perfectly with the description given by Dr. Mayr in his 'Eichengallen' (p. 7) as to leave no doubt of their identity. The galls were placed in young bark, pressing forward beneath old rind which had apparently been displaced by lightning. They were about a quarter of an inch in length, cup-shaped at the top and obconical, but usually a good deal flattened longitudinally, and irregular in form from being much pressed together. The cup-shaped mouth was sharp at the edge, and closed by a convex woody cover, woolly on the surface, with a furrow running round the circumference a little below the edge of the cap, this furrow provided with a row of deep punctures; the whole gall-head bearing much resemblance to the top of a Chinese tea-cup, with its little saucer-lid placed inside it. Besides the specimens of galls at this stage of full development and containing the full-grown larva, there were others showing it in every stage from its first appearance through the bark; whilst from the existence of the semi-globose head (which subsequently decays and withers off; exposing the characteristic cup-shaped and lidded summit of the developed gall) it is scarcely distinguishable from the single-celled form of *Aphilothrix radialis*. These specimens when first coming through the bark were shiny, rounded above, and greenish; but presently the green colour of the part visible changed to brown for about a third down the gall; this brown part gradually dying, altering in the process into various contorted shapes; and at the time when observed, about the 3rd of March, this



EO

A. CORTICIS.

cap was in some cases so decayed that it could be detached, leaving the sharp-edged cup with its cover more woolly than is presently to be found (from the persistence of the fragments of the removed fibrous top), embedded in the bark or just projecting. This alteration may be observed taking place gradually in specimens drying in-doors, where the dead top may be seen contracting and freeing itself from the hard undecayed tissue,—from the sharp edge of the cup-shaped top,—of the persistent part of the gall. These changes are shown in the accompanying figures, where the upper one gives the top beginning to shrivel; the lower, the top lifted from the characteristic form of the gall (both magnified). The exit of the perfect insect is effected through a small hole pierced in the woody saucer-like cover of the cell; and judging from the number and appearance of the tenants, the place of the rightful owner is often taken by parasites.—E. A. ORMEROD; Isleworth, Middlesex, March 20, 1877.

[Being supplied with specimens of these galls I can confirm the determination of the species. From them five specimens of the gall-makers emerged from the 8th to the 12th of April; these clearly exhibit the specific value of the gall, which greatly resembles the single-celled variety of *A. radialis*, and badly defined or much scattered galls of *A. Sieboldi* (= *corticis*). However, the makers of the three species are abundantly distinct. *Radialis* is ferruginous, somewhat like the common *C. Kollari*, but smaller; *Sieboldi* is bright red-brown; whilst *Corticis* is black-brown, almost black: both the latter species are normally larger than *Radialis*. In addition to the five *Aphilothrix* I have bred (14th April to 1st May) twenty-four specimens of *Synergus incrassatus*, H., its inquiline. Dr. Mayr's descriptions of these galls, with two figures, will be found translated in the 'Entomologist' (Entom. vii. 50).—E. A. F.]

PRACTICAL ENTOMOLOGY.—Forty-five years ago, when the history of "blights" was indeed dark—notwithstanding the labours of those giants of Entomology, Kirby and Spence—"Reaumur" wrote:—"I maintain that there can hardly be a greater service performed to horti- and agri-culturists than by pointing out to them the nature and habits of their insect enemies." Since then the honoured names of Curtis, Newman, Westwood and Murray stand forward amongst those who have done or are doing good service to the country, by

directing attention to the histories of, and remedies for, the insect pests which yearly cause it a heavy loss. Still the subject requires to be more worked out by the public at large, for the words of Edward Newman still remain as true as when he wrote them. Agriculturists know only too well the difficulties and losses, but it is only occasionally they have the time and special knowledge requisite to work out the observations how best to meet them; and entomologists, though acquainted with the history of the insects themselves, are often unacquainted practically with the working of the prescribed remedies, which are necessarily not adapted for the exigencies of each special case. To do good both must work together. Unless the cause of disease is known, prevention is impossible and cure impracticable, and, besides the history of the insect, we need returns of the amount of its presence or absence under various circumstances, to know which is the predisposing or counteracting one. "The progress of every science depends upon the discovery of facts, which may be called scientific practice, and upon the conclusions deduced from them—that is, on theory and practice. They may be compared to the army and diplomacy in statecraft. Diplomacy wages no actual warfare, but is not seldom the cause of it: and the soldiers have to make experiment after experiment, to marshal facts against facts, until it appears which side is the stronger." So writes Professor Max von Pettenkofer, in the current number of the 'Contemporary Review'; and with that axiom in view, our aim now is to develop and weld together the soldiers and diplomatists of agricultural entomology. With this view a pamphlet has recently been printed, accompanied by ruled and columned sheets for the purpose of recording monthly observations on certain selected insects, for the most part remarkable for the injury they cause to our common crops. For convenience of observers, the sheets are accompanied by short but popular descriptions and clearly-drawn figures of the insect pests, which it is hoped may save all difficulties in ascertaining what insect is intended, and guard against consequent errors. Thus, it is now hoped to obtain a general series of observations through the country, which, if followed up even partially, cannot fail to be of service. Their object is to arrive at cause and effect as influenced by various conditions of locality, weather, soil, and more

especially cultivation, with a view to the suggestion of remedies, prevention of insect attack, or limitation of injury. The distribution of these papers is somewhat of an experiment, but similar observations taken and recorded by members of the Meteorological Society have not been without benefit; and it is hoped that agriculturists, horticulturists, and field naturalists will each lend their best support, as the object is a worthy one. If reliable information can only be obtained from competent observers (which on the prepared forms would cost them but a few minutes occasional labour), it is intended to digest it into a report primarily for the benefit of the observers, and which could not fail to be of great value to the country at large. Few but those scientifically or practically concerned know the heavy money losses constantly going on from insect causes in the crops; but it is only by co-operation in observation that the root of the evil can be thoroughly reached. Further information may be obtained of the Rev. T. A. PRESTON, Marlborough, Wilts; or of EDWARD A. FITCH, Maldon, Essex.

ANSWERS TO CORRESPONDENTS.

F. BEYNON.—PYRRHOCORIS APTERUS.—Would you kindly tell me in what countries the Hemipterous insect *Pyrrhocoris apterus* is found? I have found it nowhere on the mainland, and only on the island off Teignmouth, which Curtis mentions. I may say on this rock there are no ants of any kind. On another island not far from it ants abound in great numbers, but there is no *Pyrrhocoris apterus*. It is most probable, I should think, that this insect has exterminated the ants. Is it likely that this insect was brought over by a bird?—F. BEYNON; Hardwick, Torquay.

[*Pyrrhocoris apterus* occurs nearly throughout Europe. Being a common garden insect in some parts of France, &c., it might easily be imported by chance, but I do not know that it has been. I should much like to know the grounds for thinking that "it has exterminated the ants;" the ants are more likely to have exterminated it, I think. I should be glad of specimens if it is common.—F. B. W.]

WOODSTOCK.—Can any correspondent of the 'Entomologist' give me information for working *Lepidoptera* round Woodstock?—C. LEMESLE ADAMS; The Estates Office, Blenheim Palace, Oxford.

THE ENTOMOLOGIST.

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JULY, 1877.

[No. 170.]

BIOGRAPHICAL NOTICES.

No. II.



JAMES SCOTT BOWERBANK, LL.D., F.R.S.

By JOHN T. CARRINGTON.

THE late Dr. Bowerbank, whose portrait (taken by Messrs. Maull & Co.) is given above, although little known to the present generation of scientific students as an entomologist, has every claim to a place in the biographical series now

appearing in this magazine. To him, and some of his contemporaries, we owe much of our present knowledge in various branches of Natural History. The little band of workers to whom he belonged, and who are now fast passing away, were so unostentatious, but so successful, in their studies, that they are deserving of our admiration. The pursuit of knowledge half a century ago was a very different matter from what it is in the present day; the great facilities now offered to students were then unknown.

Born 14th July, 1797, Dr. Bowerbank in due course became a member of an eminent firm of distillers in London, with which his family had long been associated. This occupation he followed for some time successfully; but, having always a strong taste for natural science, he eventually left this, to him, less congenial pursuit, and finally devoted himself entirely to Natural History. Upwards of half a century ago he was an eminent lecturer on biological subjects before the old Mathematical Society of Spitalfields, a Society which has probably produced from amongst its members more eminent scientific men than any association in this kingdom.

As an entomologist he was well known for his careful and accurate studies of insect anatomy. He chose this subject for his first published paper, which appeared in the 'Entomological Magazine,' in 1833, "On the Circulation of the Blood in Insects." To show that his interest in this subject long continued, I may remind my readers that in 1873, forty years later, he published in pamphlet form an elaborate article, 'On the Brain and a Portion of the Nervous System of *Pediculus capitis*,' which contains some interesting observations on the amount of sensation exhibited by several insects when injured or mutilated.

Dr. Bowerbank's great work, and the one by which he will be best known to posterity, is his 'Monograph of the British Spongiadae.' Of this work three volumes have already been published by the Ray Society in their Transactions; and the manuscript of the fourth was fortunately completed only within a few days of his death. Those who have worked with this splendid manual can well appreciate the amount of labour and careful observation necessary for its production. The British sponges were, until taken in hand by him, an

almost unworked group; but from him they received close attention for upwards of thirty years. As an authority in their identification and history he was almost unrivalled.

Dr. Bowerbank was a founder and original Fellow of the Ray, Zoological, and Royal Microscopical Societies; also a Fellow of the Royal Society, the Linnean, Geological, Paleontographical, Chemical, and several other learned Societies, including the London Clay Club, where he was a bright luminary on the memorable Monday evenings, and from which the Paleontographical Society had its origin. As a microscopist he was eminently successful. The present workers in that science are much indebted to him. Through his influence mainly the use of Canada balsam and other well-known and generally-adopted media for mounting microscopical objects, especially those of insect anatomy, was introduced, even if he did not discover it. Scattered papers upon many biological subjects from his pen may be found in the 'Annals and Magazine of Natural History;' the Proceedings of the several Societies to which he belonged; the 'Philosophical Magazine;' the 'Microscopical Journal;' the 'Zoologist;' the 'Entomologist;' and others. Some of the more important relate to his favourite study of the structural and geological relations of the sponges; to the *Pterodactyles*; and to the structure of shells.

Dr. Bowerbank died at his residence, at St. Leonard's-on-Sea, on the 8th of March, 1877, aged eighty years; and his remains were followed to their last resting-place by a number of his old friends and fellow-labourers in science.

His own published works are a far more permanent monument than anything that others can write respecting him. Yet because the story of his life may induce others to follow in his footsteps, it is to be hoped that before Time, the inexorable, has called away his few remaining personal friends, some of them may record more fully than can be done in these pages the life and works of so worthy a father in science as the late Dr. Bowerbank.

Royal Aquarium, Westminster,
June 20, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 162.)



Fig. 69.—*N. MINUTULUS* Fig. 68.—*N. SALIENS*.
(and magnified).

68. *Neuroterus saliens*, Koll. (= *N. saltans*, Gir.).—This gall, which is very nearly related to the former species, may be found in the second half of September on the under side (rarely on the upper side, or on the petiole) of the leaves of *Quercus cerris*: it breaks forth from a longitudinal rent in the midrib. Whilst we generally find but one or two galls of *N. ostreus* on a leaf, those of *N. saliens* are gregarious, and often occur in such a manner that the galls, placed behind one another, form a continuous line. It is hairless, smooth, slightly glossy, at first green, then reddish brown, and is of a spindle-shaped form, with a length of 3 millimetres, and a breadth and height of 1·2 millimetre; on the side next to the leaf it is fastened to the cleft in the midrib throughout its entire length by means of a narrow adherent clasp or border, whilst the gall of *N. ostreus* is only attached to the midrib at one point. This species is of great interest, as the detachment of the ripe gall from the leaf depends on the will of the contained larva. Collected galls, as yet attached to the leaf, at the beginning of October burst from it, jump and twist themselves, without the gall itself undergoing any change of form. This peculiar movement is occasioned thus: the larva, lying in the roomy cell, bends itself in a circular

manner, then quickly stretches, and thus brings about the displacement of the gall. Hitherto Dr. Giraud only has bred the fly, which he obtained in small numbers, partly in the following April and partly in the next October: thus a year after the decidence of the gall.—G. L. MAYR.

This Turkey oak, and consequently non-British, species is remarkable—as observed by Giraud, Kollar, and Mayr—on account of the spontaneous movements of its gall, the leaping larva reminding us of Dipterous habits. *Sapholytus Haimi*, Mayr, was obtained from the year-old galls by both Mayr and Haimhoffen in May and July. With respect to the appearance of the gall-flies, Dr. Giraud says he presumes they were retarded, owing to the unfavourable conditions under which the galls were kept.—E. A. FITCH.

69. *Neuroterus minutulus*, Gir.—I have two leaves from the collection of Herr v. Haimhoffen containing the pretty galls of this species. Dr. Giraud says that these galls occur on the under side of the leaves of *Quercus cerris*; but the specimens before me are on the fine reticulate veins of the upper side. They are spherical, about the size of a pin's head (1·2 to 1·5 millimetres in diameter), thickly covered with short conic-ovate tubercles, and of a rusty brown colour. There is a larva-cell in the interior. According to Dr. Giraud this gall appears at the end of October.—G. L. MAYR.

This, the smallest known oak-gall, is another Turkey oak species. Dr. Mayr gives the following additional information:—"On 24th October of this year (1872) I found the galls of this species in great numbers near Vienna, but always on the upper side of the leaf." The imago was described by Dr. Giraud from a dead specimen cut out of a gall.—E. A. FITCH.

NEW NATURAL HISTORY SOCIETY.—The Borough of Hackney Microscopical and Natural History Society was established on the 20th March, 1877. The objects of this Society are the cultivation of biological tastes in its district, and communication between members through its meetings, which are held twice a month, at 194, Mare Street, Hackney. Country excursions are frequently organised during the season. The honorary secretary is Mr. C. Willmott.—ED.

ON THE SPIDERS OF SCOTLAND: WITH A LIST OF SPECIES.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., C.M.Z.S.

(Continued from p. 159.)

Fam. DICTYNIDES.

Dictyna, Sund. = *Ergatis*, Bl.

Dictyna arundinacea, Linn. = *Ergatis benigna*, Bl. Aberdeen (J. W. H. T.); Orkneys (*id.*); Ben Nevis (O. P. C.); Berwickshire (J. H.).

Amaurobius, C. L. Koch = *Ciniflo*, Bl., *ad partem*.

Amaurobius fenestralis, Stroem. = *Ciniflo atrox*, Bl. Aberdeen, &c. (J. W. H. T.); Sutherlandshire (*id.*); Loch Katrine, Loch Rannoch, &c. (O. P. C.); Glasgow (H. C. Y.); Castle Douglas (W. D. R. D.).

A. similis, Bl. In various localities from Edinburgh to Inverness (O. P. C.).

Fam. AGELENIDES.

Cœlotes, Bl.

Cœlotes atropos, Walck. = *C. saxatilis*, Bl. Cheviots (J. H.); Castle Douglas (W. D. R. D.).

Tegenaria, Latr.

Tegenaria Derhamii, Scop. = *T. civilis*, Bl. Edinburgh, Trosachs, &c. (O. P. C.); Glasgow (C. H. Y.); Castle Douglas (W. D. R. D.); Berwickshire (J. H.).

Textrix, Sund.

Textrix denticulata, Oliv. = *T. lycosina*, Bl. Berwickshire (J. H.); Ben A'an, Ben Nevis, Loch Rannoch, &c. (O. P. C.); Sutherlandshire (J. W. H. T.); Aberdeen, Dunkeld (*id.*); Glasgow (C. H. Y.).

Cryphœca, Thor. = *Tegenaria*, Bl., *ad partem*.

Cryphœca silvicola, C. L. Koch. Paisley (M. Y.); Aberdeen, Lintrathen, Dunkeld (J. W. H. T.); Berwickshire (J. H.); Pentlands and Loch Rannoch (O. P. C.).

Hahnia, C. L. Koch = *Agelena*, Bl., *ad partem*.

Hahnia montana, Bl. Pentlands (O. P. C.); Berwickshire (J. H.); Dunkeld (J. W. H. T.); Castle Douglas (W. D. R. D.).

H. elegans, Bl. Cold Martin Moss, Berwickshire (J. H.).

Fam. THERIDIIDES.

PHOLCOMMA, *Thor.* = *Theridion*, *Bl.*, *ad partem*.

Pholcomma gibbum, *Westr.* = *Theridion projectum*, *Cambr.* Cheviots (J. H.); near Aberdeen and Inverury (J. W. H. T.); Paisley (M. Y.).

THERIDION, *Walck.* = *Theridion*, *Bl.*, *ad partem*.

Theridion tepidaricrum, C. L. Koch. Edinburgh, in greenhouses at the Botanic Gardens (O. P. C.); Castle Douglas, in a similar situation (W. D. R. D.). I have only on one occasion found this species in any other situation than in a greenhouse, hothouse, or conservatory, and that was in the kitchen-garden at the Rectory, Bloxworth, Dorsetshire, in the summer of 1869, when I found an adult male in a bed of carrots. There is no greenhouse or conservatory of any kind whatever in the parish, nor within three miles of the spot where this example occurred.

T. sisypium, *Clerck* = *T. nervosum*, *Bl.* Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.); Berwickshire (J. H.); everywhere (J. W. H. T.); Sutherlandshire (*id.*); Trosachs, Loch Rannoch, Edinburgh, and Dalswinton, Dumfries (O. P. C.).

T. denticulatum, *Walck.* Dunkeld and Inverury (J. W. H. T.).

T. varians, *Halm.* Dunkeld (J. W. H. T.); Dalswinton (O. P. C.).

T. pictum, C. L. Koch. Dunkeld (J. W. H. T.).

T. pallens, *Bl.* Dunkeld and Inverury (J. W. H. T.); Paisley (M. Y.); Peasedean, Berwickshire (J. H.).

NESTICUS, *Thor.* = *Linyphia*, *Bl.*, *ad partem*.

Nesticus cellulanus, *Clerck* = *Linyphia crypticolens*, *Bl.* Berwickshire (J. H.); Glasgow (H. C. Y.).

PHYLLONETHIS, *Thor.*, = *Theridion*, *Bl.*, *ad partem*.

Phyllonethis lineata, *Clerck*. Trosachs (O. P. C.); generally distributed, Aberdeen district (J. W. H. T.); Glasgow (H. C. Y.); Berwickshire (J. H.).

EURYOPIS, *Menge* = *Theridion*, *Bl.*, *ad partem*.

Euryopis flavomaculata, C. L. Koch. Paisley (M. Y.).

ASAGENA, *Sund.* = *Theridion*, *Bl.*, *ad partem*.

Asagena phalerata, *Panz.* = *Theridion signatum*, *Bl.* Berwickshire (J. H.).

ERIGONE, Sav. — *Neriène*, Blackw., *ad partem*., and *Walckenaera* (*id.*).

Erigone atra, Bl. — *N. longipalpis*, Bl., + *E. vagabunda*, Westw. Berwickshire (J. H.); numerous localities (O. P. C.); near Aberdeen, and Stanley, near Perth (J. W. H. T.).

E. promiscua (Cambr.). Cheviots (J. H.); found afterwards among examples of *E. longipalpis*, exact locality therefore not known (O. P. C.); Braemar, Inverury, and Dunkeld (J. W. H. T.).

E. longipalpis, Sund. Near Aberdeen and Inverury (J. W. H. T.).

E. dentipalpis, Wider. Near Aberdeen (J. W. H. T.); Berwickshire (J. H.).

E. graminicola, Sund. Banchory (J. W. H. T.).

E. pascalis (Cambr.). Near Dunkeld (J. W. H. T.); Sutherland (*id.*).

E. nigra, Bl. Near Aberdeen and Inverury (J. W. H. T.).

E. tibialis, Bl. Cheviots (J. H.).

E. longimana, C. L. Koch = *N. vagans*, Bl. Ben Nevis (O. P. C.); near Aberdeen (J. W. H. T.); near Edinburgh (O. P. C.); Cheviots (J. H.).

E. pygmæa, Bl. Berwickshire (J. H.); Ross-shire (J. F. M.); Paisley (M. Y.).

E. rubens (Bl.). Cheviots (J. H.); Ross-shire (J. F. M.); Orkney (J. W. H. T.); generally distributed (*id.*); Glasgow (H. C. Y.).

E. isabellina, C. L. Koch = *N. rubella*, Bl. Berwickshire (J. H.).

E. dentata, Wid. Near Aberdeen (J. W. H. T.).

E. agrestis, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

E. retusa, Westr. — *N. elevata*, Cambr. Berwickshire (J. H.); Paisley (M. Y.).

E. uncata, Cambr. Cairn na Glaisha (J. W. H. T.).

E. gibbosa, Bl. Cheviots (J. H.).

E. apicata, Bl. Paisley (M. Y.).

E. bituberculata, Wider. Near Aberdeen (J. W. H. T.); Paisley (M. Y.); Old Cambus by Cockburnspath (J. H.).

E. excisa, Cambr. Paisley (M. Y.); Berwickshire (J. H.).

E. latebricola, Cambr. Paisley (M. Y.).

Erigone Clarkii, Cambr. Paisley (M. Y.).

E. neglecta, Cambr. Paisley (M. Y.).

E. livida, Bl. Berwickshire (J. H.); near Aberdeen, Lintrathen, Orkney, and Sutherland (J. W. H. T.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

E. rufa, Wider = *N. rubripes*, Bl. Loch Katrine (O. P. C.); Cheviots (J. H.).

E. abnormis, Bl. Paisley (M. Y.).

E. saxatilis, Bl. Paisley (M. Y.).

E. viaria, Bl. Humbleton Hill, Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

E. sylvatica, Bl. Berwickshire (J. H.).

E. fuscipalpis, C. L. Koch = *N. gracilis*, Bl., and *N. flavipes*, Bl. Berwickshire (J. H.); Dalswinton (O. P. C.); near Aberdeen and Dunkeld (J. W. H. T.); Paisley (M. Y.).

E. sublimis, Cambr. Cheviots (J. H.).

E. conigera, Cambr. Near Aberdeen (J. W. H. T., sub. *N. conigera*); Berwickshire (J. H.), inadvertently omitted in list of Berwickshire and Northumberland spiders, 1875; and Old Cambus (*id.*).

E. Douglasii, Cambr. Near Castle Douglas (W. D. R. D.).

E. pavitans, Cambr. Cheviots (J. H.).

E. clara, Cambr. Cheviots (J. H.); Orkney (J. W. H. T.).

E. pudens, Cambr. Cheviots (J. H.).

E. morula, Cambr. Cheviots (J. H.).

ERIGONE (*Walckenaera*, Blackw.).

Erigone brevis, Wider. = *W. depressa*, Bl. Berwickshire (J. H.); Paisley (M. Y.); Arthur's Seat (O. P. C.).

E. brevipes, Westr. Near Aberdeen and Inverury (J. W. H. T.).

E. incurvata, Cambr. Near Aberdeen (J. W. H. T.).

E. Hardii, Bl. Berwickshire (J. H.).

E. cuspidata, Bl. Berwickshire (J. H.); near Castle Douglas (W. D. R. D.).

E. obtusa (Bl.). Berwickshire (J. H.).

E. nudipalpis. Berwickshire (J. H.); Paisley (M. Y.).

E. punctata, Bl. Paisley (M. Y.); near Aberdeen and Inverury (J. W. H. T.); Berwickshire (J. H.).

E. bicolor, Bl. Arthur's Seat (O. P. C.).

E. bifrons, Bl. Cheviots (J. H.); Inverury (J. W. H. T.).

E. humilis, Bl. On pavements, Edinburgh (O. P. C.).

Erigone cristata, Bl. Dunkeld (J. W. H. T.); Paisley (M. Y.).

E. antica, Wid. Berwickshire (J. H.); near Aberdeen (J. W. H. T.); Paisley (M. Y.).

E. permixta, Cambr. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

E. fuscipes, Bl. Berwickshire (J. H.); Paisley (M. Y.); Castle Douglas (W. D. R. D.).

E. scabricula, Westr. = *W. aggeris* (Cambr.). Dunkeld (J. W. H. T.).

E. pumila, Bl. Berwickshire (J. H.).

E. latifrons, Cambr. Cheviots (J. H.); Paisley (M. Y.).

E. Beckii, Cambr. Dunkeld (J. W. H. T.).

E. picina, Bl. Paisley (M. Y.).

E. pusilla, Wider. = *W. minima*, Cambr. Inverury (J. W. H. T.).

E. erythropus, Westr. = *W. borealis*, Cambr. Pentlands (O. P. C.).

E. nemoralis, Bl. Berwickshire (J. H.); Dunkeld (J. W. H. T.).

E. similis, Cambr. Near Aberdeen (J. W. H. T.).

E. ludicra, Cambr. Pease Dean, Berwickshire (J. H.).

E. trifrons, Cambr. Cheviots (J. H.).

E. fontata, Bl. Berwickshire (J. H.); near Aberdeen, Inverury, and Dunkeld (J. W. H. T.); Paisley (M. Y.).

E. acuminata, Bl. Berwickshire (J. H.); near Loch Katrine Head (O. P. C.); near Aberdeen (J. W. H. T.); Glasgow (H. C. Y.).

PACHYGNATHA, Sund.

Pachygnatha Clerckii, Sund. Berwickshire (J. H.); Aberdeenshire and Dunkeld (J. W. H. T.); Glasgow (H. C. Y.).

P. Degeerii, Sund. Arthur's Seat (O. P. C.); everywhere (J. W. H. T.); Glasgow (H. C. Y.); Castle Douglas (W. D. R. D.).

TAPINOPA, Westr. = *Linyphia*, Bl., *ad partem*.

Tapinopa longidens, Wid. Near head of Loch Katrine (O. P. C.); Cheviots (J. H.).

T. unicolor, Cambr. Pease Dean, Berwickshire (J. H.); Paisley (M. Y.).

LINYPHIA, Latr. = *Linyphia*, Bl., *ad partem*, and *Neriene*, Bl., *ad partem*.

Linyphia thoracica, Wider. = *L. cauta*, Bl. Falls of Foyers (O. P. C.); near Castle Douglas (W. D. R. D.); Dunkeld (J. W. H. T.); Berwickshire (J. H.).

L. leprosa, Ohl. = *L. confusa*, Cambr. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

L. minuta, Bl. Trosachs and other localities (O. P. C.); Berwickshire (J. H.).

L. tenebricola, Wider. = *L. terricola*, Bl., and *L. tenuis*, Bl. Ross-shire (J. F. M.); Inversnaid (O. P. C.); Glasgow (H. C. Y.); Dunkeld (J. W. H. T.); near Castle Douglas (W. D. R. D.); Paisley (M. Y.).

L. obscura, Bl. Pentlands (O. P. C.); near Aberdeen (J. W. H. T.); Cheviots (J. H.); Glasgow (H. C. Y.); Paisley (M. Y.).

L. variegata, Bl. (sub. *Neriëne*, Bl.). Ross-shire (J. F. M.); Arthur's Seat (O. P. C.); Berwickshire (J. H.); Glasgow (H. C. Y.); Sutherlandshire (J. W. H. T.).

L. expuncta, Cambr. = *L. lepida*, Cambr. Dunkeld (J. W. H. T.).

L. alacris, Bl. Berwickshire (J. H.); near Aberdeen and Lintrathen (J. W. H. T.); Paisley (M. Y.).

L. socialis, Sund. Ben A'an (O. P. C.); near Aberdeen and Lintrathen (J. W. H. T.); Glasgow (H. C. Y.); Berwickshire (J. H.).

L. luteola, Bl. = *L. alticeps*, Bl. Ross-shire (J. F. M.); Berwickshire (J. H.); Strathdon and near Aberdeen (J. W. H. F.); Paisley (M. Y.).

L. alticeps, Sund. Berwickshire (J. H.); Orkney and Braemar (J. W. H. T.).

L. cristata, Menge. (sub. *Bathyphantes*, Menge). Berwickshire (J. H.).

L. explicata, Cambr. = *L. decolor*, Cambr. Near Castle Douglas (W. D. R. D.).

L. nigrina, Westr. = *L. pulla*, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.).

L. approximata, Cambr. Berwickshire (J. H.).

L. dorsalis, Wid. = *L. anthracina*, Bl., and *L. Claytoniæ*, Bl. Loch Rannoch (O. P. C.); Paisley (M. Y.).

L. ericæa, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.); Paisley (M. Y.).

L. circumspecta, Bl. Berwickshire (J. H.); near Aberdeen (J. W. H. T.); Paisley (M. Y.).

Linyphia angulipalpis, Westr. Cheviots (J. H.).

L. experta, Cambr. Cheviots (J. H.).

L. rufa, Westr. Cheviots (J. H.); near Aberdeen and Braemar (J. W. H. T.).

L. bicolor, Bl., sub. *Neriëne*, Bl. Generally distributed. Berwickshire (J. H.); near Aberdeen and Dunkeld (J. W. H. T.); near Castle Douglas (W. D. R. D.).

L. linguata, Cambr. Berwickshire (J. H.).

L. reticulata, Cambr. Cheviots (J. H.); Cairn na Glaisher, Aberdeen, and Sutherland (J. W. H. T.).

L. pudens, Cambr. Cheviots (J. H.).

L. arcana, Cambr. Cheviots (J. H.).

L. contrita, Cambr. Cheviots (J. H.).

L. decens, Cambr. Cheviots, and Old Cambus by Cockburnspath (J. H.).

L. concolor, Wid. = *Theridion filipes*, Bl. Berwickshire (J. H.); Loch Rannoch (O. P. C., sub. *Theridion*), Glasgow (H. C. Y.); Paisley (M. Y.).

L. insignis, Bl. Dunkeld (J. W. H. T.); Berwickshire (J. H.).

L. clathrata, Sund. = *Neriëne marginata*, Bl. Trosachs (O. P. C., sub. *Neriëne*); Berwickshire (J. H.); near Aberdeen (J. W. H. T., sub. *Neriëne*); Glasgow (H. C. Y.).

L. bucculenta, Clerck = *Neriëne trilineata*, Bl. Trosachs (O. P. C., sub. *Neriëne*); Aberdeenshire; Stanley (J. W. H. T., sub. *Neriëne*); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.).

L. marginata, C. L. Koch. = *L. triangularis*, Bl. Trosachs (O. P. C.); Berwickshire (J. H.); Paisley (M. Y.).

L. triangularis, Clerck = *L. montana*, Bl. Generally distributed (J. W. H. T.); Trosachs and Loch Rannoch (O. P. C.); Glasgow (H. C. Y.); Berwickshire (J. H.).

L. peltata, Wid. = *L. rubea*, Bl. Near Aberdeen (J. W. H. T., sub. *L. rubea*); Ross-shire and Sutherland (J. F. M.); Glasgow (H. C. Y.); Berwickshire (J. H.).

L. pusilla, Sund. = *L. fuliginea*, Bl. Loch Rannoch, Black Forest (O. P. C.); Dunkeld, Sutherlandshire, and Aberdeenshire (J. W. H. T., sub. *L. fuliginea*); Glasgow (H. C. Y.).

L. hortensis, Sund. = *L. pratensis*, Bl. Aberdeenshire and Dunkeld (J. W. H. T.); Berwickshire (J. H.); Paisley (M. Y.).

ERO, *C. L. Koch.* = *Theridion*, *Bl.*, *ad partem.*

Ero thoracica, *Wid.* = *Theridion variegatum*, *Bl.* Near
Aberdeen (*J. W. H. T.*).

(To be continued.)

AN ABSTRACT OF A PAPER BY
DR. H. GRENACHER ON THE EYES OF ARTHROPODS.

By B. THOMPSON LOWNE, F.R.C.S.,

Ophthalmic Surgeon to the Great Northern Hospital; Lecturer on Anatomy
and Physiology in the Royal College of Surgeons; Lecturer on Anatomy
and Physiology at the Middlesex Hospital Medical School; &c.

DR. GRENACHER has published a very important and interesting *resumé* of his researches on the structure and functions of the eyes of insects, Arachnida and Crustaceans; an abstract of which can hardly fail to be of interest to entomologists.

It is well known that there are two rival theories as to the manner in which the compound eyes of these animals perform their function; the earlier, that of Johannes Müller, propounded fifty years ago, which has had few supporters of late years, is that each portion of the compound eye forms an element of the picture, the lenticular condition of the facet being immaterial to its production; only a straight ray of light having the same direction as the tube which forms the posterior part of the segment of the eye being utilised in the production of the impression, each segment giving rise to a single nerve stimulus only.

The second theory is that each segment of the compound eye produces a distinct inverted image of the object, just as the simple eyes of insects, the eyes of vertebrates and other animals do; a view which originated in the well-known experiment of Gottsche, who first showed the multiple inverted images, which the facets of the cornea are capable of producing, with the microscope. This theory has been almost universally adopted,—amongst others by myself,—only Boll and Leuckart having written in favour of Müller's view; yet Dr. Grenacher has shown that the adoption of this view has been too hasty, and that without any doubt Müller was right and his adversaries wrong.

I. THE STRUCTURE OF THE OCELLI.

Dr. Grenacher has investigated these organs in the larva of *Dytiscus* and *Acilius*, in several spiders, and in some perfect insects; and he shows, as Leydig did, only more completely, that there is an important relation between the structure of these organs and that of the compound eye.

The simplest ocelli are those of the larva of *Dytiscus*—the cuticle is swollen slightly to form the lens; the other structures of the eye, the vitreous and the retina with its pigment, are manifestly differentiations of the hypodermis, or cellular layer of the integument: in the young larva, the passage from the ordinary hypodermis to the cells of the vitreous is quite gradual; the pigment, which serves as a choroid, is contained at the outer ends of the cells which form the vitreous; it surrounds the nuclei of these cells; the retina consists of a series of fusiform cells, which are apparently only slightly differentiated from the cells of the vitreous body, but which are furnished with a well-developed layer of rods, so placed that they receive the image formed by the lens upon their surface.

In the eyes, stemmata, of the larva of *Acilius*, there is a very considerable advance; the lens is very convex, and the vitreous is more decidedly differentiated from the hypodermis. The retina also exhibits a very remarkable peculiarity; it is deeply cleft by a fissure, extending almost through its entire thickness, both the walls of which are lined by a series of gigantic, but evidently true rods—a condition which reminds us of the yellow spot in the axis of the human eye, at least as far as their probable function is concerned.

In spiders and *Phalangidæ* the principal difference in the ocelli, as compared with those of the already described larvæ, is that the retina is more strongly differentiated from the cells of the vitreous and hypodermis. The most remarkable peculiarity in the eyes of spiders is their dimorphism, the same insect having two sets of eyes with very different retinal structure: as an example of this, Dr. Grenacher figures and describes the two forms of eye met with in the common garden spider, *Epeira diadema*; in the anterior eyes the retinal cells are much elongated, and bear at their inner extremities a layer of very small rods, closely abutting

on the cells of the vitreous. The cells of the retina have their nuclei situated very far back; these eyes have also a sling-shaped muscle, which seems to have the function of altering the distance between the retina and the lens. The posterior eyes have no layer of rods between the retina and the vitreous, but the cells of the retina are very large, and have their nuclei at their anterior ends: they enclose very large prism-shaped bodies in their interior at some distance behind the nuclei, which Dr. Grenacher regards as percipient rods. These eyes have no muscle.

In the genus *Lycosa* the four small eyes on the forehead belong to the first kind, whilst the four great dorsal eyes belong to the second.

In the genus *Salticus* the latter form of eye is extraordinarily well developed; six of the eight eyes belong to this category, the anterior four occupying almost the whole margin of the cephalothorax.

In the simple eyes of perfect insects the retina is formed on the same type as in the first form of eyes in the spiders, but the vitreous is in general very little developed, so that the rods of the retina almost touch the posterior surface of the lens; an exception to this is seen in the single stemma of the flea, where the cells of the vitreous are comparatively well developed; they are also more strongly developed in the blow-fly than in most other insects, but they are not so well developed in it as in the flea.

(To be continued.)

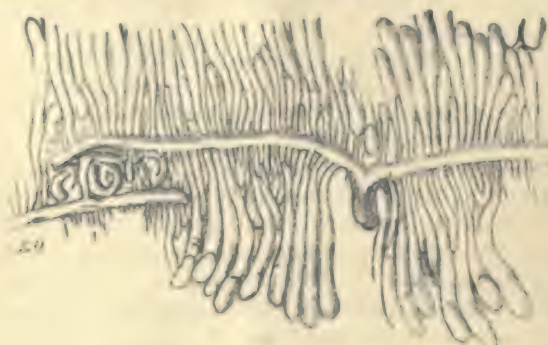
WORKINGS OF HYLESINUS FRAXINI.

By E. A. ORMEROD.

IN the spring of 1875, the ash-boring beetles (*Hylesinus fraxini*) appeared in such numbers on the trunks of some newly-felled ash trees in the neighbourhood of Isleworth, as to give an opportunity of watching their method of operation and rate of progress, and a short note may be of interest from their difference in some particulars to those of the well-known *Scolyti* of the elm.

The *H. fraxini* is mentioned by Stephens and Selby as occurring in decayed ash trees, and by E. Newman (Entom.

viii. 186) as attacking young trees, but in the instance near Isleworth the trees had grown to their average height, and were about a foot in diameter. Probably in this case the damp locality of the spot where the trees had grown, and were laid, facilitated the boring operation, especially on the lower side of the timber next the grass, which was the part chiefly affected. The beetles appeared to attack the smooth surface or any of the slight fissures indifferently, as a commencement point for their burrows, whilst the elm *Scolyti* have been noted as usually taking advantage for their start of the cracks or crevices of the rough elm bark.



WORKINGS OF *HYLESINUS FRAXINI*.

The work was begun about the 19th of April, the beetles being then wandering in great numbers over the timber, till an appropriate spot being found and the boring commenced, the beetle continued firmly at its work irrespective of any disturbance. In four days the *Hylesini* had disappeared, the only signs of their presence being the ejected results outside of their borings inside the bark. The progress was very slow, in captivity the advance of the beetle being only about half its own length in from ten to twelve hours; in natural circumstances, rarely more than half an inch in the ten days after first observation of the insects. The work was begun by a single beetle drilling a circular bore just large enough to allow of its passage, where it was shortly joined by its companion—the pair presumably working

in concert at the excavations, as the tunnel being always free of incumbrance, and occupied by both *Hylesini*, the rubbish could hardly otherwise have been passed from the hole. At about half an inch at most from the entrance the tunnel bifurcated (and pairing appeared to take place), the two new tunnels being carried slowly on to right and left, and almost at right angles with the first entrance passage, till in about five weeks they were at their full length, the burrow having the appearance (as given in the figure) of a T,



with truncate stem and elongated slightly arched arms of various length, but not exceeding two inches. For the most part, during this time, one beetle was to be found in each of the side galleries, but occasionally they were together, and sometimes a third was present, the burrowings being entirely inside the bark, so as to impinge chiefly on the bark itself, but to leave a narrow white line along the floor, where the removal of a narrow strip laid bare the white wood of the tree.

By the 4th of July most of the *Hylesini* were dead in their burrows, and a few of the channels of the larvæ begun, but not as yet in more than one of each pair of galleries; and, about three weeks later, these larval tunnels might be found completed—usually placed side by side and at right angles, as far as circumstances allowed, of both the side galleries pierced by the parent beetles. This arrangement is a material check on the increase of the beetles, as the larval galleries start so closely side by side under common circumstances as only to leave space for the larvæ in the earliest stages of their existence; with increase of growth more room is needed. The strongest or swiftest get ahead of their neighbours, and taking possession of the accommodation, leave the weaker grubs to perish; and their tunnels may be seen thinning into non-existence between the steadily increasing size of those on either hand, so that of the larvæ that start evenly from the egg frequently scarcely half the

number find room for development. In this respect the difference between burrowings of some of the species of *Hylesini* and the elm *Scolyti* is very marked, the larval channels of the *Scolyti* frequently feathering in contorted waves and in every direction after their first start from the mother gallery, reaching a length at times (as in the specimen before me) of as much as five inches, the mother gallery being, I believe, always commenced at one extremity, and uniform in its course throughout.

In soft or decayed bark, the larval galleries of the *Scolyti* cross each other not unfrequently. In the *H. fraxini* the mother gallery, bifurcated from the more or less centrally placed passage of entrance (which may be found sometimes pointing along, as well as across the timber on which it is placed), has the larval branches placed on each side with the utmost regularity in all the specimens I have seen, for the most part pointing straight from the original gallery, neither crossing nor blending with one another, and rarely exceeding in the case of borings in the fresh wood (which are the only ones I have had the opportunity of examining thoroughly) about an inch in length. This regularity of position is still more striking in the borings of *H. vittatus*, where the larval channels may be found placed longitudinally with almost mathematical precision, and is shortly noticed by Kaltenbach in his 'Pflanzenfeinde,' p. 535.

Where the larvæ of the *H. fraxini* start side by side thirteen may be counted to the half inch, whilst of those who survive to the journey's end only seven can find necessary room. Occasionally some unexplained disaster occurs to a whole line of eggs or brood in its very first stage, for the shiny specks may be found each in its own packing along the side of the gallery, but without the external gummy skin which forms the usual protection of the egg chamber, projecting slightly like minute studs along each side of the tunnels formed by the parent beetles. The egg appears never to be deposited by the side of the entrance passage, and rarely just above the fork, the space afforded being usually occupied by larval passages parallel to the first, and pupal chambers running close up to the second, as shown in the sketch.

How far the nutriment of the grub, or its power of

gnawing, necessitates its remaining in the Cambium region, between the bark and wood of recently-felled timber, may be uncertain, but the larval course (like that of the parent *Hylesini*) was invariably inside the bark, slightly infringing on the wood at the extremity of the course for the oval cell to accommodate the pupal change. This change had commenced about the 24th of July—that is, about three months from the first appearance of the *Hylesini* in April, the pupæ being then fairly numerous, in the cells at the extremity of the channelings, tightly filled throughout (down to the shiny exterior of the egg chamber projecting into the empty main gallery) with the rejected remains of their excavation. The full development to the beetle state began about three weeks later, continuing over a lengthened period.

The illustration is mainly sketched on a rubbing from a specimen of the galleries exposed by removing the bark, so as to be almost an exact *facsimile*, and shows the large proportion of larvæ which perish from want of room; and the occasional contortion of the course of one larva, where the close contiguity of the mother-galleries has caused the destruction of almost all the larvæ in the enclosed space.

Spring Grove, near Isleworth, May 2, 1877.

ON THE ABNORMAL APPEARANCE OF COLIAS EDUSA AND OTHER DIURNAL LEPIDOPTERA IN 1877.

By JOHN T. CARRINGTON.

So many have been the communications to the 'Entomologist' on this subject during the past month that I think it worthy of some remark. Excepting in the extreme north of these islands the past winter was one of exceptional mildness, with more than the average rainfall. This was followed by a cold spring, and a predominance of continued easterly wind, which even at the time of writing has not changed. Latterly, however, bright skies and brilliant sunshine have made the days hot, while the nights have still been comparatively cold. I hear from correspondents in many parts of the country that this may be considered as yet a late season: several species now due have not as yet

appeared. Still more remarkable then is the extraordinary abundance of what are usually termed "hibernated butterflies." So they may be; but when I carefully examine the reports I almost conclude that from some unknown or unobserved cause many of these examples have passed the winter in the pupa state, and appeared in the early sunshine of this season. *Vanessa Atalanta*, *V. Urticæ* and *V. Io* appear to have been common in most localities, while *Pyrameis cardui* seems to have been more common this June than it has been in autumn for many years past. I had the pleasure of counting one day this week, and after six o'clock in the evening, seventy-five specimens during a walk of five miles on the Essex coast. *Vanessa Antiopa* has been recorded once, as observed near Scarborough. The most remarkable appearance this season is that of *Colias Edusa*. This butterfly has been seen in greater or less numbers during June all over the kingdom, from Central Scotland to Land's End; and is reported from some places where its occurrence has never previously been recorded. Most of our correspondents remark upon the exceeding freshness of the specimens captured, and some speak of an exceptional rosy purple tinge suffused over the ordinary yellow. From these observations, and from the fine ciliæ of several specimens kindly sent alive to me by various correspondents, I am tempted to think that they had only very recently emerged. I scarcely consider it right to call this species double-brooded, for I do not think it has passed through its various metamorphoses this spring, but only remained over winter in the pupa state. The question raised by this abnormal development is well worthy of further discussion. A very large number of communications on this subject have been sent to the 'Entomologist,' from which the following is a selection, as illustrating the geographical distribution of *Colias Edusa* this spring. Our correspondents' reports are condensed, as it would be impossible to find space for them all.

SURREY.—Abundant at New Maldon, first observed June 3rd; H. T. Dobson, jun. Redhill, June 4th, very bright in colour; Sydney Webb. Forest Hill, June 7th, fine specimens; H. Ramsay Cox. Barnes, large numbers, including var. *Helice*; F. M. Phillips. Woking, large numbers; H. Goss. Norbiton, observed in such numbers as to cause

astonishment, and chiefly in fine condition; A. J. Windybank. Egham Lock, "abounds here"; R. E. Salwey. Caterham Junction; E. G. Browne.

KENT.—Beulah Hill and Nunhead Junction; S. Stevens. Shooter's Hill and Darenth Wood; E. G. Browne. Darenth Wood, several; H. C. Dent. Gravesend, commonly; Rev. P. H. Jennings. Eastbourne, considerable numbers, some fine as bred, and two var. *Helice*, June 7th; G. F. Gottwaltz.

ESSEX.—Maldon, quite common; Rev. J. W. Mills. Commonly; E. A. Fitch. Chingford, June 6th, very fine; R. L. Rolph. Loughton and Chingford, upwards of forty seen on one day, all fine; T. Eedle. Hackney Marshes, several, and one var. *Helice*; T. Eedle. Lea Bridge, June 17th, rather worn; G. Pearson.

MIDDLESEX.—June 1st and 4th, at Highgate and Hampstead; R. T. Gibbons.

WILTSHIRE.—Salisbury, commonly; H. C. Dent. Plentiful; Henry Neale.

SOMERSET.—Bath, commonly; H. C. Dent. Castle Cary, large numbers; W. Macmillan.

HERTS.—Knebworth, common, "not previously known to occur here"; B. Brown.

DORSET.—Near Bloxworth, on May 30th, and many subsequently; Rev. O. Pickard-Cambridge.

HAMPSHIRE.—Portsea, quite plentiful, in very fine condition and bright in colour, June 11th; R. J. Kent. New Forest, common; J. Jenner Weir. Winchester, up to June 8th quite abundant, and in fine condition; E. F. Johns. Isle of Wight, in profusion, June 3rd to 15th; V. R. Perkins. Common; J. Jenner Weir. Southampton, June 2nd, 3rd and 4th, common, and in fine condition; Rev. A. C. Hervey. "Literally swarmed, in the proportion of about one male to five females"; W. McRae.

SUSSEX.—Chichester, June 4th, abundant, some very fine with rosy purple lustre, also several var. *Helice*; Joseph Anderson, jun.

OXFORDSHIRE.—Oxford, several on June 9th and 10th; A. F. Hernaman. Windsor, common; W. A. Watson.

NORFOLK.—Thrunxton, June 8th and 15th, common; H. Reeks.

CAMBRIDGESHIRE.—Chatteris, June 4th, one, "hibernated"; H. F. Fryer.

YORKSHIRE.—Scarborough, about June 3rd to 19th, "very bright in colour, not like hibernated"; W. Robinson and J. H. Rowntree. Leeds, fine specimens at Upper Wortley; T. Benn. Ilkley; Bernard Hartley.

LANCASHIRE.—Southport, June 3rd, several; G. Eastham. Middleton, six miles north of Manchester, in abundance; John Thorpe. Withington, near Manchester, several; A. Aspinwall. Bury; R. Kay.

DURHAM.—In considerable numbers (eighteen years since the last capture); J. E. Robson.

CARNARVON.—Llanduduo, several; J. Carter.

DUMFRIESSHIRE.—Several, about 3rd and 4th June; W. Lennon.

I need only add that several contributors state the specimens seen were flying steadily from south-west to north-east, simply giving this statement without offering an opinion upon it.

Royal Aquarium, Westminster,
June 21, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ON THE HIBERNATION OF BUTTERFLIES.—I was for a fortnight during the early part of this month at Brockenhurst, in the New Forest, and was particularly struck by observing on the wing numerous specimens of *Vanessa polychloros*, *Pyrameis cardui*, *Gonepteryx rhamni*, and *Colias Edusa*. The point that I am anxious for information on is whether these butterflies had passed the winter in the perfect or chrysalis state? Has anyone ever found a chrysalis of any of them in the winter months? It has always been my opinion that the *Vanessæ* hibernate in the imago state only, and that those which hibernate have remained torpid immediately after their emergence from the chrysalis, and have flown only to a place of concealment. I have found imagines of *Vanessa Urticæ* nearly a foot below the surface, in the crevices of chalk, when digging for fossils; and from the exposed position in which the chrysalids of the *Vanessæ*

are suspended I believe that none of that genus hibernate in the chrysalis state; but it may be different with the species of *Colias* and *Gonepteryx*.—J. JENNER WEIR; 6, Haddo Villas, Blackheath, June 22, 1877.

VANESSA ANTIOPA NEAR SCARBOROUGH.—On the 4th of this month, in Harwood Sale, eight miles off, I saw, and came within very little of capturing, a good specimen of *Vanessa Antiopa*. Being without net and near a river, which the insect crossed, I was obliged to be content with the sight for some five minutes of this the third specimen of this insect which I have seen in England.—W. ROBINSON; West Bank, Scarborough, June 12, 1877.

PAPILIO MACHAON AND COLIAS HYALE IN ESSEX.—One of my pupils has taken a specimen of *Papilio Machaon*, where the wild carrot grows in many parts on the Essex marshes. A few *Colias Hyale* have also been taken.—[Rev.] JOHN W. MILLS; St. Lawrence Rectory, near Maldon, Essex, June 18, 1877.

COLIAS HYALE IN ESSEX.—During the last two days I have seen two, if not three, specimens of *Colias Hyale* in South Essex.—E. A. FITCH; Maldon, June 9, 1877.

COLIAS HYALE.—On June 13th I captured a fine specimen of *Colias Hyale* (female) on the celebrated Runnymede, between Egham and Old Windsor.—R. E. SALWEY; Egham Lock, Surrey.

DEILEPHILA LINEATA.—On June 13th a specimen of *Deilephila lineata* was captured in a brick field about a mile from this town.—R. KAY; 2, Spring Street, Bury, June 18, 1877.

REVIEW.

Illustrations of Typical Specimens of Lepidoptera-Heterocera in the Collection of the British Museum. Part I. By ARTHUR GARDINER BUTLER. London. Printed by order of the Trustees, 1877. 4to; pp. xiii., 62; Twenty Coloured Plates.

THE present work is perhaps one of the most important which has been published by the Trustees of the British Museum upon Entomology. At the present day the literature

of every science is growing so fast that it is becoming almost impossible to keep up with it, and it is of the utmost importance that our progress should be sure as well as rapid. Hitherto the British Museum collection of moths has not been illustrated at all, though many hundreds (we might, perhaps, say thousands) of new species have been described from it by the late Mr. Walker. But the more species are described the more difficult becomes their identification, and where no figures of a species exist it is frequently almost impossible to identify it by description alone, even when it is correctly classified, well described, and its affinities carefully indicated, which is not always the case; indeed, some of our best Lepidopterists have gone the length of asserting that all descriptions unaccompanied by figures are worse than useless. Hence the importance of accurate figures being published of Mr. Walker's species during the lifetime of his contemporaries, and while most of his types are still readily determinable.

The volume now before us contains good coloured figures of upwards of two hundred moths, the greater number of which were originally described by Mr. Walker, and the remainder (including a few new species) chiefly by Mr. Butler. Of the twenty plates, three are devoted to *Castniidæ* and *Uraniidæ*, two to *Agaristidæ*, one to *Chalcosiidæ*, one to *Sphingidæ*, one to *Gegmetridæ* and *Pyrалidæ*, one to *Lithosiidæ*, &c., and the remainder entirely to *Zygønidæ* and *Arctiidæ*; all the species figured are fully described by Mr. Butler.

We congratulate the Museum authorities and the author upon the appearance of the first part of this very useful work, in which we hope that the greater number of types existing in the British Museum will ultimately be figured; and attractive as are the handsome species so well figured in the part now before us, we hope that the smaller and more obscure groups will also find a place in subsequent volumes, as their identification without figures is even more difficult. It is our firm conviction that the collation and extension of our knowledge concerning species already described is of far greater importance to the real interests of Science than the mere description of new species; and we are glad to see that the latter object has not been made a prominent feature of the work.

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[No. 171.]

VARIETY OF MELITÆA ARTEMIS.



MELITÆA ARTEMIS (var.).

THE accompanying figure, drawn by Mr. Willis and engraved by Mr. Kirchner, represents a very curious variety of *Melitæa Artemis*, now in the collection of Mr. Samuel Stevens, of Upper Norwood. It was obtained by its present owner some years ago from an old British collection; but the precise locality of its capture is unknown.

AN ABSTRACT OF A PAPER BY
DR. H. GRENACHER ON THE EYES OF ARTHROPODS.

By B. THOMPSON LOWNE, F.R.C.S., &c.

(Concluded from p. 183.)

II. THE STRUCTURE OF THE FACETTED EYES.

THE compound eyes of insects and crustaceans exhibit great variety in their structure: the author describes them under three distinct groups, which he names—1. Aconic eyes. 2. Pseudoconic eyes. 3. Euconic eyes.

They have been described by former observers as consisting of—1. A cornea, with more or less numerous facets. 2. A crystal-like cone behind each corneal facet, composed of four cells united to each other, the primitive existence of

the four cells being usually indicated, in the imago, by the persistence of four nuclei which lie immediately behind the facet of the cornea. 3. The recipient rod, connected more or less intimately with the inner extremity of the crystal cone. These bodies, as is well known, converge towards the optic ganglia, and form the greater part of the radiating structure of the eyes. The author proposes the terms *retinula* and *rhabdom* to designate the parts of this structure, which exhibits a very different condition in the different forms of compound eyes. 4. The pigment cells which surround the crystal cone and the recipient rod.

1. *Aconic Eyes*.—In these the primitive cells of the crystal cone remain distinct throughout life, so that this organ cannot be said to be developed. These cells are so arranged that they form a funnel-shaped body, narrow at its inner extremity, which is closely surrounded by pigment, so that only a very small clear space is left at its apex opposite the centre of the corresponding facet. The *retinula* consists of seven cells, which are parallel or nearly parallel, except at their outer extremities, where they curve towards each other, so that the rods which they have imbedded in their substance approach the opening in the pigment. The axial cell of the *retinula* is most strongly developed, and appears alone to be connected with the optic nerve by a single nerve fibre. The rods which are contained in these cells are enlarged at their outer extremities, and terminate in points behind. The nematocerous *Diptera*, the *Cimicidæ*, the *Dermaptera*, and apparently all the *Coleoptera*, except the *Pentamera*, have aconic eyes.

2. *Pseudoconic Eyes*.—Dr. Grenacher describes the eye of *Tabanus bovinus* as a typical example; it is characterised by the existence of a conical space enclosed in front by the facet of the cornea; behind by four nucleated cells, corresponding to those immediately behind the cornea in the aconic eye, and surrounded by two large thin pigment cells. This space is filled during life with a clear fluid, which contains but little coagulable substance; it represents the crystal cone of the euconic eye, but it cannot be considered to represent it morphologically, as it lies outside the nucleated crystal cells. The *retinula* consists as before of seven elongated cells, but these are united so as to form a tube

which extends from the crystal body to the optic nerve; the cells are distinctly nucleated, and the tube which they form contains seven long thread-like rods, which are attached to its inner surface. In *Musca vomitoria* the outer extremities of the rods are somewhat thickened, are less highly refractive, and pass between the cells of the crystal body. These were mistaken by M. Schultze for a fasciculus of fine nerve fibres. Pseudoconic eyes are found in all the true *Diptera* (*Heterocera*).

3. *Euconic Eyes*.—Those in which a crystal-like body is found between the retinula and the facet of the cornea formed by the fusion of the four cells already mentioned: the nuclei of these cells are found between this structure and the cornea, at least when they can still be recognized. In the greater number of these eyes the number of cellular elements which form the retinula is still seven. There are, however, many deviations from this number. In bees and hornets there are eight cells, as there are also in a great exotic species of *Cicada*. In *Orthoptera* and in Geodephagous and Hydra-dephagous *Coleoptera* there are four; in some of the latter, however, there are certainly more than four, but only four take any part in the formation of the rods. In the diurnal *Lepidoptera* the estimation of the number of component cells is so difficult, owing to their intimate fusion, that the author states that he can say nothing certain about it. In the euconic eye the cells of the retinula are united into a tube which closely surrounds the rhabdom, an angular rod consisting of the united rods of the retinal elements. In some pentamerous *Coleoptera*, the *Orthoptera*, *Hymenoptera*, *Cicadæ*, dragonflies, and diurnal *Lepidoptera*, the retinula is of nearly equal thickness, except that it is slightly narrowed within on account of the radial arrangement of these organs. In these insects the rhabdom is not remarkably modified in any part of its course. In the *Crepuscularia* and in the *Nocturna*, in some *Coleoptera* and in the *Phryganidæ*, it usually exhibits two swellings—a smaller conical swelling immediately behind the crystal cone, and a more considerable enlargement at its inner extremity. The outer swelling contains the nuclei of the retinula; and the posterior is remarkable from the manner in which the rhabdom sends broad plate-like processes between the constituent cells, so that in

section it exhibits a stellate appearance. In the Crustacea the structure of the faceted eyes is in the main the same as that of the euconic eyes of insects; but the number of the cells from which the crystal-cone is developed is variable. In the great majority of the Crustacea there are four, as in insects, but there are only two in Amphipods, *Gammarus* and *Hyperina*; in Isopods, *Asellina* and *Oniscoidea*; and in Schizopods, *Mysis*; there are five in the Cladocera, *Daphnia*, &c.; and in the Phylopodous genus, *Estheria*; but there are only four in *Apus* and *Branchipus*. The number of elements in the retinula is also variable; there are usually seven, as in the majority of insects; there are only five in *Hyperinis*, *Apus*, and *Branchipus*; and four in *Gammarus*. Each retinula appears externally to have the same form throughout its entire length; but in many genera the rhabdome shows enlargements, which are stellate in section, as in insects.

III. ON THE MORPHOLOGICAL RELATIONS OF THE SIMPLE AND COMPOUND EYES.

Aconic eyes are comparable in structure to the simple ocelli; each consists of a transparent lenticular swelling of the cuticle, of certain modified cells of the hypodermis, the vitreous in the ocellus and the crystal cells of the aconic eye, and of the retina in the ocellus and the retinula in the compound eye. Dr. Grenacher concludes that the two forms of eye are the result of the modification, in two opposite directions, of a primitive but rudimentary type; in the one the tendency has been towards the multiplication of retinal elements and the perfecting of a dioptric apparatus; in the other towards the reduction of the retinal elements to a single receptive structure, which attains its highest form in the rhabdome of the euconic eye—the lens remaining as a rudimentary structure, or being altogether lost as in the *Hyperida*, the perfection of the compound eye being attained by the multiplication of the component ocellulae.

IV. ON THE FUNCTION OF THE COMPOUND EYE.

As has been already stated, Dr. Grenacher returns to the theory of Johannes Müller; and it will be seen that the anatomy of the compound eye is entirely in favour of the

view. The great depth at which the percipient structures lie, especially in the euconic eye, added to the fact that the greater part of the picture formed by the lens is shut off from the retinula by a dense layer of pigment, which is only performed by a minute opening in the axis of the ocellulus, are diametrically opposed to the dioptric theory: moreover, the depth at which the small image is formed by the corneal facet does not correspond to that of the recipient organ. The further facts in favour of Müller's theory, adduced by the author, are that the highest perfection of the compound eye is attained in the great multiplication of the number of component ocellulæ, and in the fusion of the percipient structures of each into a single organ connected with a single nerve filament; and that the corneal facets in the *Hyperideæ* are incapable of forming any picture, although no one can suppose the sense of vision in these crustaceans is of an imperfect character.

NOTE BY THE TRANSLATOR.—Some years ago, whilst investigating the structure of the compound eye of the blow-fly, I was led to take the view that the dioptric theory was the true one; but I am completely convinced, by the valuable researches of Dr. Grenacher, that I was wrong in so doing; I never, however, expressed myself very strongly on the point, but distinctly stated that the subject was one which, for a time at least, must remain uncertain. There is one strong point which has not been mentioned by Dr. Grenacher, or as far as I know by any one, although it cannot fail to have occurred to the author of this monograph; it is, that the existence of a large number—many thousand—components of the picture, each one of which is reversed, would require some very special modification of the nervous apparatus to produce a general picture, the parts of which retain the same relations they possess in the reality. No doubt a decussation of nerve fibres is possible, which should reverse the reversed components of the picture; each facet, however, of the compound eye has but one nerve fibre in relation with it. On the other hand, in the *Diptera* at least there is a general decussation of nerve fibres in the great optic nerve of the compound eye; those from the upper facets crossing those from the lower, and those from the

anterior crossing those from the posterior, before they enter the optic ganglia. Müller, in his classical work on the organs of sense, pointed out the fact that the eyes of Arthropods, which are adapted for seeing in the water, do not differ, in the distance of the recipient structures from the cornea, or in the relative convexity of the latter, from those which are adapted for vision in air, as they should if dioptric vision existed.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

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No. III. NYMPHALIDÆ—DANAINÆ.

THE classification of *Lepidoptera* is confessedly exceedingly difficult, and is still far from satisfactory. Many groups are natural, and are recognized as such at a glance; but it is extremely difficult to determine the relations in which these stand to one another, and our existing arrangements can only be regarded as tentative. It would therefore be out of place to discuss the various systems in detail in a series of elementary papers, and I will only briefly mention those of the butterflies here.

Linné commenced his classification of *Lepidoptera* by arranging the largest and handsomest species at the head of each genus, without much regard to structure, and he consequently placed the swallow-tails and the great blue South American butterflies (*Morpho*, &c.) in the same group, at the head of his genus *Papilio*, although the former have six perfect legs, and the front pair of the latter are atrophied. His successors removed these species, but both Boisduval and Doubleday left the six-legged swallow-tails, forming their restricted genus, *Papilio*, at the head of the butterflies. More recently, however, Bates has re-arranged the families of butterflies according to a system adopted by several continental entomologists since the time of Linné, placing those families of butterflies in which the front legs are least developed at the head, and those which have six perfect legs next to the moths; and his system, being recognized as the most natural, is now generally adopted by English and German

entomologists; and being used, with some trifling modifications, in my 'Synonymic Catalogue of Diurnal Lepidoptera,' will also be employed here.

The first of the five great families of butterflies is that of the *Nymphalidæ*, which comprises about half the known species. It may easily be distinguished from all the others by the front legs being rudimentary in both sexes, especially in the males; and the pupa is suspended freely by the tail. The *Nymphalidæ* may be divided into the eight following families, the last of which probably requires further subdivision:—*Danainæ*, *Satyrinæ*, *Elyminiæ*, *Morphinæ*, *Brassolinæ*, *Acræinæ*, *Heliconinæ*, and *Nymphalinæ*. In the present paper we will consider the *Danainæ* only.

The *Danainæ* have lately been extended to include all the genera formerly classed with the *Heliconinæ*, except the genus *Heliconius* itself, and consequently comprises genera of very different external appearance. The larvæ are smooth, with fleshy processes, and the submedian nervure of the fore wing of the imago is double at its origin.

The wings of the *Danainæ* are usually rounded (sometimes slightly dentated), and the hind wings are never tailed, which only occurs, in this family, in some *Nymphalinæ*, and very slightly in some *Satyrinæ*, &c.

The first genus, and the one which contains the largest species of this sub-family (averaging about five inches across the wings) is *Hestia*, which is found in the East Indies. These are butterflies of a semitransparent white, more or less clouded or spotted with black or brown, especially on the cell of the fore wings. They are said to be butterflies of very elegant appearance on the wing, from which they have sometimes been called, "spectre butterflies." They differ considerably in shape, and the wings, as in most of the butterflies of this group, are very large in comparison to the size of their bodies.

Passing over *Ideopsis*, an East Indian group resembling the last, but smaller, and in some species more like the next genus in markings, we arrive at *Danaus*, a large group found in all tropical countries. The predominating pattern is a dark ground colour, the centres of all the wings being filled up with white, yellow, greenish, or fulvous. These paler markings sometimes extend over the whole wing, and

are sometimes entirely broken up into spots. The only European species of the *Danainæ* is *Danaus Chrysippus*, a fulvous species with black borders dotted with white, and a white macular band across the black tip of the fore wings. The hind wings are marked with four black spots. There is a common African form in which the hind wings are white, with a fulvous edging within the black border. *D. Chrysippus*, like all the *Danainæ*, is well protected from enemies by the toughness of its integuments, and by its exuding a strongly-smelling fluid when handled. Most of the *Danainæ* are "mimicked" by other butterflies, but few to such an extent as *D. Chrysippus*, which is most closely represented by the females of different species of *Elymnias*, *Argynnis*, *Hypolimnas*, and *Papilio*. The *Danai* have the hind margins slightly dentated, and the costa of the fore wings slightly concave; they generally average about three inches in diameter, but the largest and one of the commonest species, the well-known North American *D. Erippus*, measures four inches across the wings, while the smallest of the green species, *D. Pumila*, does not measure two inches in expanse. All the American species, like *D. Chrysippus*, are fulvous.

The genus *Amauris* is entirely African, and the few species it contains are black or brown insects, about three inches in expanse, with the fore wings spotted, and more or less of the base of the hind wings occupied with semitransparent white. In some species, there is a yellowish band on the hind wings, and in one the spots of the fore wings are also yellowish. These insects are "mimicked" by different species of *Papilio* and *Hypolimnas*.

The genus *Euplœa* contains a number of Asiatic species, and a few African and Australian. The wings are either longer or rounder than in *Danaus*, and are usually less distinctly denticulated. The species vary from two to four inches in expanse, and are generally of a rich dark-brown colour, often shot with blue, and more or less spotted with white or blue, especially near the margins of the wings, and on the disks of the wings beneath. Generally speaking this genus is one of the most easily recognisable of any; but it is "mimicked" not only by species of *Papilio* and *Elymnias*, but even by some *Bombyces*.

The last Old World genus of this subfamily, *Hamadryas*, contains a very few species in Amboina, Australia, &c., black,

with rounded wings, spotted with semitransparent white on the fore wings, and with the disk of the hind wings filled up with the same colour. The hind margins are spotted with white beneath. These insects do not exceed two inches in expanse, and much resemble some species of *Neptis* (*Nymphalinæ*) in appearance.

The South and Central American species of *Danainæ* are exceedingly numerous, and cannot easily be confounded with any other butterflies, except certain species of *Heliconius* and *Dismorphia*; from the latter they may be at once distinguished by their imperfect front legs, and from the former by the larger discoidal cell of the hind wings. They are generally insects with long slender bodies, and long narrow rounded wings, frequently more or less transparent. The greater part of the smaller species fall into the genus *Ithomia*; and a large number are more or less transparent, a character which, though not confined to them or to South American butterflies, is rare in other groups and in other countries. Among the more interesting of the remaining genera are *Lycorea*, black and fulvous butterflies, three or four inches across, with yellow spots on the fore wings, and a row of marginal white dots on the hind wings; *Thyridia*, nearly as large, but with narrower wings, transparent, edged and streaked with black; and "mimicked" by different moths of the families *Castniidæ* and *Pericopidæ*; *Mechanitis* and *Melinæa*, narrower and smaller insects than *Lycorea*, but similarly marked with black and fulvous, and generally also with yellow; and *Tithorea*, generally resembling *Lycorea* in pattern, and of nearly equal size (one species, *T. Bonplandii*, is rich deep black, with milky white spots on the fore wings and round all the hind margins, and a broad yellow band near the base of the hind wings).

The New World *Danainæ* are a somewhat difficult study, as the species are very numerous and closely allied. They are also very uniform in colour, the prevailing tints being black, transparent, fulvous, yellow, and white. A great number of *Ithomiæ* are figured in Hewitson's 'Exotic Butterflies'; and there is a very valuable paper by Bates on the *Heliconidæ* of the Amazon Valley (Trans. Linn. Soc., vol. xxiii., published in 1862).

Our next article will be devoted to the *Satyrinæ*.

ON THE SPIDERS OF SCOTLAND; WITH A LIST OF SPECIES.

By the Rev. O. PICKARD-CAMBRIDGE, M.A., C.M.Z.S.

(Concluded from p. 181.)

Fam. EPEIRIDES.

META, C. L. Koch = *Epëira*, Bl., *ad partem*.

Meta segmentata, Clerck = *Epëira inclinata*, Bl., + *E. Mengii*, id. Universally distributed (O. P. C., J. W. H. T., J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

M. merianæ, Scop. = *Epëira antriada*, Bl., + *E. celata*, id. At the foot of Ben A'an (O. P. C.); Berwickshire (J. H.); everywhere (J. W. H. T.); Glasgow (H. C. Y.).

M. menardi, Latr. = *Epëira fusca*, Bl. Near Aberdeen (J. W. H. T.); foot of Ben A'an (O. P. C.).

TETRAGNATHA, Latr.

Tetragnatha extensa, Linn. Trosachs (O. P. C.); Berwickshire (J. H.); Sutherland, and generally in Aberdeen district (J. W. H. T.).

CYRTOPHORA, Sim. = *Epëira*, Bl., *ad partem*.

Cyrtophora conica, Pallas. Inverury, Rothiemay in Banffshire (J. W. H. T.).

SINGA, C. L. Koch = *Epëira*, Bl., *ad partem*.

Singa hamata, Clerck = *Epëira tubulosa*, Bl. Near Castle Douglas (W. D. R. D.).

S. alborittata, Westr. = *Epëira calva*, Bl. Braemar, near Aberdeen, Inverury (J. W. H. T.).

S. pygmæa, Sund. = *Epëira anthracina*, Bl. Dunkeld (J. W. H. T.).

CERCIDIA, Meuge = *Epëira*, Bl., *ad partem*.

Cercidia prominens, Westr. = *Epëira bella*, Meade. Berwickshire (J. H.).

ZILLA, C. L. Koch = *Epëira*, Bl., *ad partem*.

Zilla x-notata, Clerck = *Epëira similis*, Bl. Everywhere (O. P. C.); Glasgow (H. C. Y.).

Z. atrica, C. L. Koch = *Epëira calophylla*, Bl. Everywhere in Aberdeen district (J. W. H. T.); Ross-shire (J. F. M.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

EPEIRA, Walck. & Thor. = *Epëira*, Bl., *ad partem*.

Epëira cucurbitina, Clerck. Loch Rannoch (O. P. C.); Sutherland, Aberdeenshire, Dunkeld (J. W. H. T.); Glasgow (H. C. Y.).

E. diademata, Clerck = *Epëira diadema*, Bl. Everywhere (O. P. C.); universally distributed (J. W. H. T.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

E. scalaris, Walck. Braemar (J. W. H. T.).

E. cornuta, Clerck = *Epëira apoclista*, Bl. Foot of Ben Nevis (O. P. C.); everywhere in Aberdeen district, Sutherland, East Ross (J. W. H. T.); near Castle Douglas (W. D. R. D.).

E. quadrata, Clerck. Everywhere in Aberdeen district, Sutherland, East Ross (J. W. H. T.); Loch Rannoch (O. P. C.).

E. umbratica, Clerck. Braemar (J. W. H. T.).

E. Youngii, Cambr. Perthshire (M. Y.).

Fam. THOMISIDES.

XYSTICUS, C. L. Koch = *Thomisus*, Bl., *ad partem*.

Xysticus cristatus, Clerck. Everywhere in Aberdeen district (J. W. H. T.); everywhere (O. P. C.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

X. viaticus, C. L. Koch. Near Aberdeen (J. W. H. T.).

X. pini, Hahn. = *Thomisus audax*, Bl. Old Cambus by Cockburnspath (J. H.).

X. cinereus, Bl. Berwickshire (J. H.).

X. lanio, C. L. Koch. Dunkeld (J. W. H. T.); Cheviots (J. H.).

X. erraticus, Bl. Arthur's Seat (O. P. C.); Banchory (J. W. H. T.); Old Cambus by Cockburnspath (J. H.).

X. bifasciatus, C. L. Koch. Arthur's Seat (O. P. C.).

X. trux, Bl. Arthur's Seat (O. P. C.); near Aberdeen, Dunkeld (J. W. H. T.); Glasgow (J. H.).

X. atomarius, Panzer = *Thomisus versutus*, Bl. Near Aberdeen (J. W. H. T.); Berwickshire (J. H.).

X. horticola, C. L. Koch = *Thomisus pallidus*, Bl. Arthur's Seat and Pentlands (O. P. C.); Berwickshire (J. H.).

PHILODROMUS, Walck. = *Philodromus*, Bl., *ad partem*.

Philodromus aureolus, Clerck. Strathdon (J. W. H. T.).

Philodromus cespiticolis, Walck. Dunkeld (J. W. H. T.); Loch Rannoch (O. P. C.); Berwickshire (J. H.).

P. elegans, Bl. Aberdeenshire, Dunkeld, Lintrathen (J. W. H. T.).

THANATUS, *C. L. Koch* = *Philodromus*, *Bl.*, *ad partem*.

Thanatus oblongus, Walck. Berwickshire (J. H.).

Fam. LYCOSIDES.

OCYALE, *Sav.* = *Dolomedes*, *Bl.*, *ad partem*.

Ocyale mirabilis, Clerck. Keith, Blair Gowrie in Perthshire (J. W. H. T.); foot of Ben A'an (O. P. C.); near Castle Douglas (W. D. R. D.).

DOLOMEDES, *Latr.* = *Dolomedes*, *Bl.*, *ad partem*.

Dolomedes fimbriatus, Clerck and Bl., + *D. ornatus*, Bl. Loch Rannoch in 1858, by the well-known collector of insects, the late Mr. Foxcroft.

PIRATA, *Sund.* = *Lycosa*, *Bl.*, *ad partem*.

Pirata piraticus, Clerck, sub. *Lycosa*, Bl. Near Loch Katrine and Loch Rannoch (O. P. C.); Strathdon (J. W. H. T.); near Castle Douglas (W. D. R. D.).

P. Knorri, Scop. Dr. Koch tells me that he has received this spider from the Isle of Arran, where it was captured by Mr. Kyle. This is its first record as British.

P. leopardus, Sund. = *Lycosa cambrica*, Bl. Aberdeenshire (J. W. H. T.); near Castle Douglas (W. D. R. D.).

TROCHOSA, *C. L. Koch* = *Lycosa*, *Bl.*, *ad partem*.

Trochosa biunguiculata, Cambr. Braemar (J. W. H. T.).

T. cinerea = *Lycosa allodroma*, Bl. Dunkeld, Stanley near Perth, Banchory near Aberdeen (J. W. H. T.).

T. picta, Hahn. Common on the coast (J. W. H. T.); Berwickshire (J. H.).

T. ruricola, De Geer = *Lycosa campestris*, Bl. Perth, Keith in Banffshire (J. W. H. T.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

T. terricola, Thor. = *Lycosa agretica*, Bl. Arthur's Seat (O. P. C.); Dunkeld (J. W. H. T.); Old Cambus (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.); Berwickshire (J. H.).

LYCOSA, *Latr.* = *Lycosa*, *Bl.*, *ad partem*.

Lycosa annulata, Clerck = *L. saccata*, Bl. Aberdeenshire (J. W. H. T.); everywhere in dry water-courses,

probably mixed up with the next species (O. P. C.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

Lycosa agricola, Thor. = *L. fluviatilis*, Bl. Shores of Loch Rannoch (O. P. C.); Aberdeen (J. W. H. T.).

L. Traillii, Cambr. Braemar (J. W. H. T.).

L. lugubris, Walck. Foot of Ben A'an (O. P. C.).

L. pullata, Clerck = *Lycosa obscura*, Bl. Cheviots (J. H.); Ben A'an, Ben Nevis, &c. (O. P. C.); Strathdon in Aberdeenshire (J. W. H. T.); near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

L. nigriceps, Thor. = *L. congener*, Cambr. Near Aberdeen (J. W. H. T.); near Castle Douglas (W. D. R. D.).

L. palustris, Linn. = *L. exigua*, Bl. Berwickshire (J. H.); generally distributed, but probably confused with the next species (O. P. C.); near Castle Douglas (W. D. R. D.).

L. monticola, Clerck. Aberdeen, Dunkeld, Lintrathen in Forfarshire, near Castle Douglas (W. D. R. D.); Glasgow (H. C. Y.).

TARENTULA, Sund. = *Lycosa*, Bl., *ad partem*.

Tarentula pulverulenta, Clerck = *Lycosa rapax*, Bl. Ben A'an, Ben Nevis, Schiehallion, &c. (O. P. C.); Glasgow (H. C. Y.); Aberdeen (J. W. H. T.); Berwickshire (J. H.); near Castle Douglas (W. D. R. D.).

T. aculeata, Clerck. Braemar (J. W. H. T.); not before recorded as British, but hitherto confused with the preceding species. Dr. L. Koch has also received this species from the Isle of Arran, captured by Mr. Kyle.

T. andrenivora, Walck. Ben A'an (O. P. C.); Perth, Keith, Aberdeen (J. W. H. T.); Glasgow (H. C. Y.).

Fam. SALTICIDES.

EPIBLEMUM, Hentz. = *Salticus*, Bl., *ad partem*.

Epiblemum scenicum, Clerck (= *S. scenicus*, Bl., *ad partem*). Strathdon, Banchory, Dunkeld (J. W. H. T.); Arthur's Seat, &c. (O. P. C.); Berwickshire (J. H.).

HELIOPHANUS, C. L. Koch = *Salticus*, Bl., *ad partem*.

Heliophanus cupreus, Walck. Dunkeld, and Muchalls near Aberdeen (J. W. H. T.).

EUOPHRYS, C. L. Koch = *Salticus*, Bl., *ad partem*.

Euophrys reticulatus, Bl. Arthur's Seat (O. P. C.).

Euophrys æquipes, Cambr. Paisley (M. Y.).

E. frontalis, Walck. Aberdeen (J. W. H. T.); Old Cambus (J. H.).

ATTUS, Walck. = *Salticus*, Bl., *ad partem*.

Attus falcatus, Clerck = *Salticus coronatus*, Bl. Dunkeld (J. W. H. T.); Berwickshire (J. H.).

A. erraticus, Walck. = *Salticus distinctus*, Bl. Paisley (M. Y.).

SALTICUS, Latr. = *Salticus*, Bl., *ad partem*.

Salticus formicarius, Walck. Scotland (Dr. Leach, Encyclop. Britt. Suppl. to 4th, 5th, and 6th Ed., Art. *Annulosa*). Dr. Leach gives no locality nor description. I am inclined to think, however, that his record is trustworthy.

PS.—Since the above list was drawn up, Dr. L. Koch, of Nuremberg, has informed me of two species received by him from Arran, and not hitherto recorded as British,—*Pirata Knorri*, Scop., and *Tarentula aculeata*, Clk. These, now inserted in their place, *supra*, raise the total of known Scotch spiders to 215.

Bloxworth, Dorsetshire.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 173.)

70. *Spathegaster baccarum*, L. (= *S. interruptor*, H.).—This, the commonest of the berry galls, which, shortly after the appearance of the leaves of *Quercus sessiliflora*, *Q. pedunculata*, and *Q. pubescens*, occurs on their under side, as well as on the catkins, in May, is very sappy, green (catkin specimens more or less red), translucent, spherical, hairless, and as big as a pea; it is so contexturate with the leaf that a more or less convex, sharply defined, circular disk, with a small boss in the middle, is apparent on its upper surface. This disk has a diameter of 3·5—6 millimetres; it is only in a rare case, when the gall occurs on the midrib, that it does not grow through the leaf, and in the catkins it occurs on the flower-stalk. In section the gall exhibits a very sappy, soft parenchyma, which is hollowed out in the centre as a larva

cell. The galls occurring on *Q. pubescens* are covered with short, scattered, both simple and branched, hairs, of about 0·3 millimetre in length, so that they greatly resemble the following species. In the second fortnight of May, sometimes



Fig. 70.—*SPATHEGASTER BACCARUM*.

the beginning of June, the flies bite through the galls, whereupon they become completely shrivelled in a few days; only such galls as are inhabited by inquiline retain their shape; and often dry, brownish yellow, but still perfectly spherical, galls may be found in autumn, which always contain a *Pteromaloid* larva or pupa. From Herr Forel I obtained the galls of this species from the Vosges and from the Lake of Geneva.—G. L. MAYR.

It is this species which is the cause of the well-known currant galls of the oak; and here we have a slight departure from the general uniformity of gall species: those of *S. baccarum* differ somewhat from the circumstance of their situation, and become divisible into two varieties, though both are structurally constant: these are (1) the true currant gall, Linné's *Quercus pedunculæ*, occurring on the stamiferous flowers; and (2) the berry gall, Linné's *Quercus baccarum*, occurring on the leaf. Both varieties occur together; they are very common, generally distributed, and conspicuous either on the young leaves or catkins in the first fortnight of May in the South of England, June, in North Britain. Like other abundant galls its increase is much

limited through parasitism. Dr. Mayr has established seven species amongst the *Synergi* and *Torymidæ* alone, viz.:—*Synergus albipes*, H., *S. facialis*, H., *S. radiatus*, Mayr, *Callinome abdominalis*, Boh., *C. incertus*, Först., *C. regius*, Nees, and *C. auratus*, Fonsc. These all appear on the wing at about the same time as, or a little later than, the *Spathegaster*. There is a fact of some interest (as pointed out by Mayr) noticeable in the parasitism of *C. incertus*, as he received specimens, which he was unable to separate, as follows:—seven bred from *Bathyaspis aceris*, three from *S. baccarum*, four from *S. nervosa*, and seventeen from *Cecidomyia circinans* galls. Now if these thirty-one specimens were specifically equal, their inhabiting both oak and maple galls is certainly aberrant; and, further, one of the oak species is dipterous. Respecting *C. auratus* (= *appropinquans*, Ratz.), Mayr says:—"In one well-authenticated case I have found the larva of this species sucking a pupa of *S. baccarum*." I have myself seen this on many occasions, and succeeded in breeding the *Callinome* from the opened gall some six or seven times. This is by far the commonest parasitic inmate of these galls in Britain; it appears about a fortnight later than the gall-maker; both are very readily bred, owing to the rapidity of their metamorphosis—a striking contrast to *Neuroterus*. There is an opinion prevalent amongst American entomologists that many, if not all, oak *Cynipidæ* are double-brooded, and that the two broods produce galls distinct from one another. Although I cannot think that this holds amongst European species, there is a link wanting in the life-history of this gall now under notice. It is at present only known for about one month out of the twelve: e.g., in 1872, for which year I have the fullest record, I noticed no gall before the 6th May, and the last *Spathegaster* bred, out of some hundreds, emerged on 3rd June; possibly three weeks would be an average for the time elapsing between the first noticeable appearance of the gall and the emergence of its maker. Now the question is what is its state during the eleven months from June to May? The imagoes are certainly short lived, and I think it may be doubted whether the next year's buds are sufficiently matured to receive the egg, laid as it is in both fruit and leaf galls. The close observation of any catkin-gall producing species

might settle the question. Mr. Bassett, with the assistance of Mr. Riley, has bred *C. operator*, O. S., from the woolly bud galls of the shrub oak (*Quercus ilicifolia*), and from the acorn-cup galls on the same tree. Should the flies bred from these two galls be specifically identical, of which, however, I think there is great doubt, it would revolutionise many ideas of gall-history as now understood; one of general application being, as mentioned above, the constancy of the production. For further information on the double-brooded theory Mr. Bassett's paper must be consulted (Can. Ent. v. 91); it is shortly to be enlarged upon, giving the results of four years' further observation. To return to the question of parasitism:—In addition to the *Synergi* and *Torymidæ* we have a *Eurytoma* and *Pteromalus*; the former is bred much more frequently than the latter; however, both occur later than the other inmates, the *Eurytoma* generally appearing to the end of July. *Zeiraphera communana* was bred from this gall by Mr. C. G. Barrett: this is a *Tortrix* which frequently lives in the common oak-apple (see Entom. ix. 40).

This season two or three valued correspondents, as well as myself, have endeavoured to throw further light on the life-history of this species, but with very limited, if any, success; one fact noticed has been its relative scarceness this year. However, Dr. Adler, of Schleswig, is said to have "proved" the metagenesis theory to hold in *Cynipidæ*; but I prefer to leave the above as written some time since, and wait for further information on so important a discovery. If *Neuroterus lenticularis* is but a "forme transitoire" of *Spathegaster baccarum*, it surely should not be difficult of direct proof. From a life-history point of view, as at present followed out, it certainly is possible.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ADDITIONAL NOTES ON *COLIAS EDUSA*.—Below are further records of the abnormal occurrence of *Colias Edusa* during last June in the following additional localities:—

SUFFOLK.—Many specimens near Ipswich; H. Miller, jun.

MIDDLESEX.—Upwards of thirty, many in splendid condition; W. J. Vandemburgh.

HEREFORDSHIRE.—A great many seen; P. T. Horne.

NORTHUMBERLAND.—Many seen on banks of Tyne and its tributaries, also on the coast, chiefly from 20th to end of June; W. Maling.

DURHAM.—June 3rd to 14th quite commonly; A. Mitchel. "I know now of scores seen or taken in this county, while I question if half a dozen autumnal stragglers have been taken during the last twenty years. I have a letter to-day, from Berwickshire, from a collector who has taken ten, including a pair in cop.; John E. Robson."

ROXBURGHSHIRE.—One very fine specimen, June 17th, at Jedburgh; A. Elliott.

Two errors inadvertently occurred in the list of localities published last month. Mr. H. Goss' captures were in Ashdown Forest and East Grinstead, on June 8th; and between Cheesington and Leatherhead, June 9th. Mr. Reeks points out that Thruxton is in Hampshire, and not in Norfolk as printed: he adds,—“On June 19th I took a beautifully fresh pair of *Colias Edusa* in cop., which will, I think, prove they had not hibernated.”—JOHN T. CARRINGTON.

COLIAS EDUSA BRED.—June 6th, female captured; 8th, eggs laid on *Medicago lupulina*; 14th, eggs hatched. July 7th (afternoon), two larvæ fixed for changing; 9th (morning), two perfect pupæ; 21st (12 to 1 p.m.), two males emerged. I distributed some seventy or eighty eggs, and have now seventeen larvæ, ninety-three pupæ, and have bred two imagos; but owing to the roaming habits of the larvæ in finding some convenient ledge on which to pupate, several were lost. The larvæ were fed almost exclusively on lucerne (*Medicago sativa*) and white clover (*Trifolium repens*). This is, I believe, the first instance of *Colias Edusa* being reared in this country.—EDWARD A. FITCH; Maldon, July 21, 1877.

SPHINX PINASTRI IN SUFFOLK.—A fine specimen of this almost doubted British species was captured about a month since at Tuddenham, near Ipswich, by the Rev. John Longe. It was at rest on a tree trunk when discovered, and in close proximity to honeysuckle in blossom.—H. MILLER, Jun.; Ipswich, July 19, 1877.

SPHINX PINASTRI.—I send you a drawing of *Sphinx pinastri*, bred by me from a pupa found near here, but when

I cannot remember. It emerged August 5, 1876.—[Rev.] E. H. FRERE; Horham Rectory, Wickham Market, Suffolk.

[The drawing sent by the Rev. E. Hanbury Frere is a well executed sketch of *Sphinx pinastri*.—ED.]

CIDARIA RETICULATA BRED.—I have at last succeeded in rearing a gorgeous specimen of this insect from a larva I obtained last autumn. This is, I believe, the first time that it has been bred in this country. I had almost given up all hopes of success after the many long journeys I have had to obtain the larva.—J. B. HODGKINSON; Preston, July, 1877.

RARE LEPIDOPTERA IN CAMBRIDGESHIRE FENS.—While collecting *Lepidoptera* in the Cambridgeshire fens, during June last, I captured a perfect male *Hydrilla palustris*, and two specimens of *Bankia argentula*. I also took a fine series of *Macrogaster arundinis*, *Meliana flammea*, and of *Nascia ciliaris*. I have also bred *Gelechia morosa* from larvæ collected there.—A. B. FARN; Dartford, July 10, 1877.

HYDRILLA PALUSTRIS AT WICKEN FEN.—At about 12.30 a.m. on the 12th June, when leaving Wicken Fen after a night's collecting, a *Noctua* not familiar to me crawled up the glass of my lantern whilst it was resting on the ground; it proved, on examination when I reached home, to be a male specimen of *Hydrilla palustris* in fair condition.—A. H. JONES; Shrublands, Eltham, July 7, 1877.

HELIOTHIS SCUTOSA.—In common, I have no doubt, with many of your readers, I have read with much interest the paper, in the 'Entomologist' for May, by Mr. E. A. Fitch, noticing the occurrence in the South of England of two specimens of *Heliothis scutosa*, and referring to those taken in Cumberland between forty and fifty years ago. As it seems probable this rare species will now take its place permanently in British lists, it seems only reasonable that whatever credit may attach to the first discovery should be distinctly awarded where it is due. I thought some one better qualified would have taken up the subject in the 'Entomologist;' but as this has not been done I give below what I believe will be found to be the correct account of the capture of the Cumberland specimens. The first known British specimen of *H. scutosa* was taken in July, 1833, near Dalston, a village in the immediate neighbourhood of Carlisle, by Mr. James Cooper, then and for some years

subsequently resident in that city, and now living near Warrington. He carried it alive to the late Mr. T. C. Heysham, of Carlisle, who some time after forwarded it to Mr. Curtis, who described and figured it in his work on 'British Entomology.' The other, and next in order of date, was the capture by Mr. Rothwell, near Skinburness on the Solway, in August, 1834, as mentioned by Mr. Heysham in the memorandum sent along with his specimen to Mr. Curtis. With respect to the food of the larvæ I have reason to believe that *Artemisia campestris*, usually assigned as the food-plant of this species, does not grow in the county. There is, however, little doubt they would feed on other plants of the genus. *A. vulgaris* is found in many parts of the district, and *A. maritima* occurs rather sparingly along the coast; but neither could be described as plentiful. It is most probable the plant at which Mr. Rothwell made his capture was the ragwort (*Senecio Jacobæa*), which in some districts of the county is called "muggert" or "mugwort." It is very abundant near the coast, and its large heads of golden yellow flowers prove very attractive to many insects, and are visited, especially at night, by large numbers both of *Noctuæ* and *Geometræ*.—J. W. HARRIS; Derwent Bank, Broughton, *via* Carlisle.

EPHESTIA ELUTELLA, A DESTRUCTIVE INSECT.—During the autumn of last year (1876) a large quantity of chicory was stored in a warehouse in this city: the room was filled to within a foot of the ceiling. This was not examined until about two months ago, when, to the amazement of the owner, the entire ceiling and walls were covered with a fine web-like material, in texture not unlike very thin and fine kid-leather. The top of the chicory was also covered with webs or galleries, in which were feeding thousands of lepidopterous larvæ. A portion of the web was removed from the ceiling in one piece, not less in size than ten feet long by five wide. This was exhibited at our Naturalists' Field Club meeting as a great curiosity. At the time of exhibition I gave my opinion that these larvæ were most probably those of *Ephestia elutella*, from the fact that I had some larvæ of that species in a tin box feeding on currants, and also some in a wooden box feeding on currants and aniseseed mixed. Above the food in both boxes was a web of similar texture to the one exhibited.

I therefore concluded the larvæ I had were either *E. elutella* or *Plodia interpunctella*. The larvæ answered much better to Stainton's description of the latter insect than to the former; therefore I was much in doubt. However, the question has been set at rest; and the insect proves to be *Ephestia elutella*, for I have bred one from the mixed food, and also one from currants; Mr. Smith, of this city, one of the members of our club, the gentleman who exhibited the sheet of web, has also bred two specimens from chicory: and all prove to be *E. elutella*. The great destruction of chicory caused by the larvæ of this insect proves what a pest it may become if not kept in check. On making enquiry at the warehouse infected I found that some years ago the owners had some foreign chicory, and were very much annoyed with moths the following season; so they had the room stoved, and had not noticed any until last season, when a few were observed, but nothing was done to destroy them, the owner having no idea they would in time prove so destructive. The larvæ feed a long time, for I have had some six months, and they are only now just going into pupæ, but they do not seem to have grown at all during the last four months.—W. PREST; Holgate Road, York, June 8, 1877.

THE "FLY" AND YOUNG CLOVER.—In this county great has been the outcry about the young clover plant—which this year in most localities, under favourable conditions, came up thicker than perhaps was ever remembered—being taken by the "fly." Hundreds of acres I hear are completely eaten off, and the plant consequently destroyed, as there is no chance of young clover coming again, thus differing from corn plant, which is sometimes renovated in an extraordinary degree after the attacks of slug or wireworm. Red clover (*Trifolium pratense*), to which this note principally refers, is sown amongst the corn in the spring for the succeeding year's crop; and every farmer knows the importance of his plant standing. To estimate the damage accruing to the loss of plant would be difficult; but it may be stated that the cost of seed and sowing is generally valued at from ten to twelve shillings per acre. It is useless to fight against an unknown enemy; and the two great insect enemies to clover plant are unknown, though by no means unfelt: these are what is commonly talked of by agriculturists as (1) the "fly" and (2)

"the white maggot," which feeds at the roots, and by separating the crown is the cause of much loss of plant in the second spring. I have had many specimens of this coleopterous larva, but never succeeded in rearing it. With regard to the former, a gentleman, who has more entomological knowledge than the average of agriculturists, in so much that he knows the "turnip fly" to be a beetle, assures me the "clover fly" is the same insect; whether it be the *Haltica* I think is very doubtful, but this is circumstantial evidence that the little depredator is coleopterous: it may possibly be *Sitones*. Although I have forty-nine acres of red clover, all of which is more or less affected, after repeated search—in sunshine, in dull weather, and by night—I have quite failed to find a single *Haltica*, weevil, or whatever the "fly" may be. A small slug occurs in plenty, and I must think these have done the whole damage in my case: it is well known they assist at all times, more or less according to seasons. I hope this note may lead to the identification of this little unknown. Last Monday, when out driving, I noticed what was to me an unknown agricultural implement at work in a field of barley, and found it consisted of some coarse sacking (old guano bags) stretched over a frame, and trailing loose behind; the frame running on two wheels was being driven up and down the field "to brush the fly off the young clover." Whether "Pertwee's patent" stayed the plague, I know not. However, it was decidedly a move in the right direction, an attempt to cope with insect attack. I hear from one source that the young lucerne has suffered in like manner with the clover.—EDWARD A. FITCH; Maldon, Essex, June 6, 1877.

CAPTURES AT EPPING.—Amongst my captures in Epping Forest this season I may note the larvæ of *Pyrameis cardui* in great profusion: they may now be found in some districts on almost every thistle plant. During the first week in June the pretty little *Erastria venustula* was not infrequent; while during the early part of this July *Limacodes asellus*, *Stigmonota interruptana*, and *Chrosis Audouinana* were taken.—T. EEDLE; 40, Goldsmith Row, Hackney Road, E., July, 1877.

PYRRHOCORIS APTERUS.—In answer to Dr. Buchanan White, as to what my reasons are for supposing *Pyrrhocoris apterus* had exterminated the ants from the rock off Teignmouth, I

thought, at the time I wrote, it would have been strange if ants had not been on it at the time of separation from the main land, and seeing the great number there are on a rock not far from it, I jumped to the conclusion that *P. apterus* had exterminated them—although by what means I could not exactly see.—F. BEYNON; Torquay, June 4, 1877.

MEETINGS OF SOCIETIES.

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.

THE ordinary monthly meeting of this Society was held in the Small Lecture Hall, Borough Museum, Liverpool, on the 30th ult. The President in the chair. Mr. Nicholas Cooke, the vice-president, read the following remarks respecting the discovery and distribution of *Nyssia zonaria*:—

“In the ‘Entomological Magazine’ (ii. 437), for the year 1834, the following notice of the capture of *N. zonaria*, written by the late Edward Newman, appeared:—

“‘This beautiful and remarkable addition having been made to our British *Lepidoptera*, and Mr. Eveleigh, the President of the Banksian Society of Manchester, supposing it to have been an entirely new species, having most kindly brought to town three specimens purposely for description in this Magazine, among my “Entomological Notes,” I immediately submitted them to the notice of Mr. Stephens, who had never seen anything like them before.

“‘I then applied to Mr. Children, whose entomological library I knew to be unrivalled in this country, and who with the most prompt kindness, informed me the insect was *Zonaria*, both of Hübner and Duponchel.

“‘A single specimen of the male was taken on the rushes about half a mile below Black-rock, near Liverpool, in September, 1832; and about the middle of the same month, in the following year, from twelve to twenty specimens of the same insect—both males and females—were taken in the same locality.

“‘The captor is Mr. Nicholas Cooke, of Liverpool.

“‘The following is the description of the insect:—The female apterous with seven rings on the body; the zone is,

as nearly as may be, that of *N. hispidaria*. I shall be glad to show the specimens to any entomologist who may wish to see them.—EDWARD NEWMAN.'

"As it is well known to every one who has been in the habit of taking this insect that it could not appear in September, it may be interesting to state the facts relating to the capture, the second of which I have just read.

"In September, 1832, my brother Benjamin found a pupa of this species in the sand on the Cheshire coast, which proved to be a female; but the imago did not appear till after I had captured a number of the perfect insects during the February of 1833, and which I took to the late Joseph Eveleigh, of Manchester.

"Many years since I was collecting insects on the Cheshire Sandhills, in company with James Cooper, of Warrington, when we found a number of larvæ, which I told him were those of *Zonaria*; and I remember him remarking that he had found the same larvæ in the North.

"I lately wrote to him for the particulars of his capture, and he sent me the following reply:—'When I came to Preston from Carlisle, or shortly after, I was engaged by the Preston Literary and Philosophical Society, and sent out to the Hebrides to collect birds, about the year 1844. It was when so engaged that I found the larva of *Zonaria* on the Island of Bernera. The few larvæ I found I put into a small box, and bred a female, but did not know what it was till next year when I found plenty near Lytham, and bred both males and females from these.'

"It is remarkable that nearly all the collections of *Lepidoptera* in this kingdom have been supplied with this species from the Cheshire coast, although I have little doubt, if properly looked for in suitable places, it might be found all round our coast; I have a strong impression on my mind that it has been captured on the south side of the Dee, and again near Llandudno. Bernera is the extreme north-west point of Scotland, and a small island, so that it probably exists along the west coast for several hundred miles;—and why not on the east and south coasts? How the apterous female gets across the rivers I do not know, but its existence on a small island is, I think, a good proof that that island has once formed part of the main land."

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[No. 172.]

THE COLORADO BEETLE.

By E. A. ORMEROD.



DORYOPHORA DECEMLINEATA (COLORADO BEETLE).

THE Colorado beetle is come. Slowly, but steadily, it accomplished its journey of fifteen hundred miles in about eighteen years. From Nebraska and Iowa it came on till, in 1865, it was in Missouri, and had crossed the Mississippi; passing through Indiana and Ohio, in 1870, it reached the borders of Canada and New York; and in 1871, floating along Lake Erie on sticks or leaves, it established itself in the neighbourhood of Niagara. Last year it was reported in such vast numbers on the eastern coast of America as to poison the air by the quantities in which it was thrown up on the shore in Connecticut; it was noticed on vessels out at sea; and in the autumn a specimen of the allied species (the *Doryophora juncta*, of the Confederate States) was found in

Germany. This year the much-feared pest made its first European appearance towards the end of June in a potato field near Cologne; and during the present month it has appeared in Liverpool. It is here at last; and it is a matter of national importance to meet it promptly and effectually.

This year it will probably do little harm: the crops are mostly fully grown, and some already stored; but the habit of the beetle to hibernate twelve or eighteen inches below the surface of the ground secures it from changes of temperature; and when next year's warmth, at the end of April, is bringing up the potatoes is the time when the beetle may be looked for to come up also, and begin its ravages. It is a foe of no ordinary strength; its powers of flight help to disperse it widely. As we have seen, near Cologne, burning the infested crop is no security against pupæ buried too deeply to suffer from the heat; and in its American journey it has shown that the colder rather than the hotter climate is suited to it. Where in possession of a field, a few days suffice for the destruction of the potato leaves; and, once started, the successive broods recur through the warm season at an interval of only about six weeks from the laying of the egg to the development of the perfect beetle ready to lay again. The eggs (fig. 4) are laid on the young shoots, or on the under side of the potato leaf, and hatch in about a week. The larvæ (orange-coloured grubs, fig. 3) are full fed in about a fortnight, when they go down into the ground, and changing there into pupæ reappear as developed beetles in another fortnight.

The beetle itself, *Doryophora decemlineata* (fig. 2, and fig. 1 magnified), is about half an inch long, broadly oval in shape, and easily distinguishable by its orange colour, with ten black stripes, five on each wing-case. The female lays from seven hundred to a thousand eggs at one time, and three or more broods may be produced each season. In their own country they may be seen in the invaded districts literally everywhere: on roads and fences, in the houses and the carriages, in every cranny they can get into; and the sum total of injury to crops attacked is simply utter ruin. At present we have only to do with stragglers; and it is of the greatest importance to spread a knowledge of their appearance over the country as rapidly as possible, that none of these may escape; everyone that is found should be destroyed at

once. If let go free that one beetle may be just the starting-point of a countless horde. They are easily distinguishable by their ten black stripes and orange colour; and all such beetles should be destroyed.

Presently—next season, it is to be feared, if not the present one—the eggs should be looked for on the young shoots and beneath the potato leaves, and all that are accessible, as well as the orange larvæ, should be picked off and destroyed at once; but on a large scale all are not accessible, and then is the time to be prepared with the only application which hitherto has been found thoroughly to keep the larvæ in check. This dressing, which is simply a solution of Paris green (arsenite of copper) sprinkled over the infested plants, is easy of application; the proportion used is three table-spoonfuls of green mixed with half a bucket of water first, and run through a funnel-shaped strainer into about two more bucketfuls of water. This quantity is put into a tin can, with two india-rubber tubes at the bottom, each with a rose at the end, and a simple lever apparatus inside shuts off the supply when wished. With this tin can—of which the details are given more fully in agricultural reports—fastened on his back, one labourer can sprinkle five to eight acres a day; and no evil results have been found to follow from the arsenic. A pound, or somewhat more, is sufficient for one acre; and the only precaution requisite seems keeping the tin specially for that purpose, and insisting on care with regard to the green that might be left about or adhering to the labourer. As a dangerous poison, it requires great attention in the using; but it appears in no way to make the potatoes prejudicial to health, and to be a certain means of keeping the larvæ in check.

Whilst the present excitement lasts, the *Doryophora* is not likely to make good its settlement generally; but the great danger lies in the neglected nooks to which its wings may convey it, but to which a knowledge of its appearance and destructive powers will not so soon penetrate. There, as with many of our destructive insects, will be the places from which, once established, it will reappear perpetually; and the entomologist who will spread the requisite knowledge of its appearance, and the means of prevention, in his own district, will be doing most important service, and carrying

out the request from Government that each one would aid in stamping out the new comer, or diminishing its ravages.

We cannot hope to escape it. As at first it transferred itself from the *Solanum hirsutum* to our own potato, and on its journey has strayed again to other vegetables, we may hope that the attack will not be concentrated on one crop; but though to all appearance the beetle is coming, as with reasonable care it has been kept down in Canada and the States, so it may be, if we will follow the same plan, here.

As yet few of us are acquainted with the habits of the *Doryophora* from personal observation; but we have reliable information from many sources, and amongst these the reports of Prof. Riley, Mr. A. Murray, and the Canadian Minister of Agriculture, from which I have taken some detail of the life-history and remedy.

In the illustration I have also benefitted by the specimens placed by Mr. Murray, at Kew, and at the Bethnal Green Museum.

Spring Grove, near Isleworth,
August 16, 1877.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. IV. NYMPHALIDÆ—SATYRINÆ.

PART I.

THE *Satyrinæ* are a group not remarkable for size and beauty, but are especially interesting to European Lepidopterists, because they are so well represented in this part of the globe, nearly a third of the European butterflies being *Satyrinæ*. They are usually small or middle-sized butterflies, of dark colours, with rounded wings (sometimes more or less dentated, and occasionally ending in a short tail), and are nearly always ornamented with ocellated spots. They cannot well be confounded with any other butterflies: the perfectly-closed hind-wing cells and the presence of ocellated spots on the wings will suffice to separate them from any group except the *Brassolinæ*; but these are large and robust insects, with a family likeness of their own, which would

prevent their being confounded with the smaller and much more delicately formed *Satyrinæ*. The larvæ are spineless, with a bifid tail; and those of the European species mostly feed on grasses.

The first two genera, *Cithærias* and *Hætera*, are about two inches and a half across the wings, and have short, broad fore wings, almost perfectly transparent except the fringes and nervures, and sometimes one or two narrow transverse brown stripes. The hind wings are transparent, tinged with red, purplish, or yellow, or marked with black along the hind margin, and with a blue or black eye containing a white pupil, and encircled with yellow at the front angle, and sometimes also at the anal angle. The next genus, *Pierella*, is brown, often semitransparent, with transverse lines across, most conspicuous beneath, and with a marginal row of black eyes with white pupils, often represented by dots below, one or two of which, placed at the front angle of the wing, are the most conspicuous. The hind wings are usually more or less red, yellow, black, blue, or white, towards the outer margins: one species (*P. Hortona*) is black, with the centre of the hind wings and a stripe on the fore wings blue. The next genus, *Antirrhæa*, is larger, some species measuring four inches across. They are brown, with large blue spots, sometimes on the fore wings and sometimes on the hind wings; one species (*A. Miltiades*) has a large irregular cream-coloured spot on the hind wings, instead of blue. The hind wings in several species are much dentated, and often produced into a short tail.

We now come to one of the most remarkable species in the family, *Cærous Chorinæus*. It is brown, about four or five inches across, the fore wings are strongly hooked and crossed by a broad tawny band, and the hind wings are bordered by a row of almost confluent darker tawny spots. The hind wings are almost square, the hind margin somewhat convex; but at the outer angle is a short tail placed almost at right angles to the hind margin, beneath which the wing runs almost straight to the anal angle.

This insect, like all we have yet mentioned, is South American; but the genera *Zophoessa*, *Lethe*, *Blanaida*,*

* In the forthcoming Supplement to my 'Catalogue of Diurnal Lepidoptera,' I have substituted this name for *Neope* and *Enope*, both being preoccupied.

Ptychandra, *Gnophodes*, and *Melanitis*, are Indian or African. They are insects measuring two to three and a half inches in expanse, and the hind wings are generally strongly dentated, and often prolonged into a short tail. *Zophoessa* contains brown species, with a submarginal row of black spots on the hind wings, ocellated beneath. The species of *Lethe* are also brown, and have usually a more or less well-marked white stripe across the apex of the fore wings. *Blanaida* resembles *Satyrus* (*Lasiommata*) in colour, being brown, spotted or marked with tawny, but may be distinguished by its larger size and more dentated hind wings. *Ptychandra* is of a rich purplish blue, a colour not common in the *Satyrinæ*, but is marked beneath with submarginal eyes in an unmistakably Satyrine manner. *Gnophodes* contains a few brown insects, with a transverse yellow stripe across the fore wings near the tip, and is confined to Africa. In both *Gnophodes* and *Melanitis* the fore wings are hooked, and the hind wings strongly dentated. *Melanitis Leda* is an abundant insect in Asia and Africa; it is brown, with a very large black spot near the tip of the fore wings, with a white pupil, and another white spot above it. The hind wings have one or two minute spots near the anal angle. The apical markings of the fore wings are often partly surrounded with fulvous, or the fore wings may be considerably suffused with this colour. The under side varies excessively, scarcely two specimens being alike; it is generally mottled or striped with brown, sometimes with large and distinct submarginal ocelli, and sometimes with these reduced to white dots. This insect shuns the direct rays of the sun, and is generally found flying in shady places, or at dusk.

Several of the succeeding genera are among the most remarkable in the subfamily. *Orinoma Damaris*, a Himalayan butterfly, about two and a half to three inches across, resembles the genus *Danaus* in pattern. It is brown, with yellowish spots and stripes, and has a triangular orange spot at the base of the fore wings, upon which are two or three black dots. The East Indian genera *Zethera* and *Neorina* contain large species, from three to four and a half inches in diameter. *Zethera Pimblea* hardly resembles the *Satyrinæ*, being brown, with a broad transverse white band across all the wings, and the edges spotted with white. *Z. Musa* is

brown, with a broad greenish white band on the front half of the hind wings, and with yellow spots below this and on the hind margins. The species of *Neorina* are brown, and each has a large black spot with a minute white pupil, and one or more larger white spots above and below, near the tip of the fore wings. *N. Hilda* has a transverse yellow band across the fore wings, extending to the tip of the hind wings, and large black eyes with white pupils and yellow rings at the tip of both fore and hind wings beneath. The other two species have short tails. *N. Crishna* is marked like *N. Hilda* with yellowish white; and *N. Lowii* has a large blotch of the same colour at the apex of the hind wings, adjoining a smaller one at the anal angle of the fore wings. *Anadebis Himachala* is a North Indian butterfly, three inches across, marked above and below with submarginal black eyes, pupilled with white, and surrounded with clay-colour. *Oressinoma Typhla* is a delicate South American butterfly, measuring about two inches across the wings; it is brown on the hind margins and smoky towards the bases, the intermediate space being white; the hind margins beneath are marked with an inner white and outer yellow line, both of which are much indented on the hind wings.

Most of the smaller American *Satyrinæ* belong to the genus *Euptychia*, which now contains over one hundred and fifty species. They vary from one to two inches in expanse, and are usually brown, though occasionally wholly or partly white or blue; their hind margins are marked with a variable number of eyes, especially beneath, an eye at the tip of the fore wings, and those at the tip and anal angle of the hind wings being generally the most conspicuous; on the under side there are generally two brown transverse lines towards the base. *Ragadia Crisia*, from the East Indian islands, is remarkable for the brilliancy of the silver centres of the marginal eyes on all the wings beneath. It is an obscure, dull tawny insect, about two inches across, with darker transverse stripes, broader and more numerous than in *Euptychia*; the markings of the upper side are merely those of the lower surface, seen through. The genus *Maniola* or *Erebia* (from which the South African species have been separated under the new generic names of *Leptoneura* and *Pseudonympha*) is too well known to need extended notice.

The species are nearly all mountain insects, and are found throughout the Palæarctic region (North Africa excepted), in South Africa, and in Arctic and Western America. The Himalayan species have been separated as *Callerebia*: the fore wings are more rounded, and the inner margin of hind wings is considerably concave; at the tip of the fore wings is a large black eye, bipupilled with white, in a yellow ring, and a smaller one with one pupil at the anal angle of the hind wings; beneath, the hind wings are clouded with gray, and have two small eyes at the anal angle.

The next genus, *Æneis*, may be known from any other European genus by the veins of the wings being very slightly dilated. The species are tawny, with black marginal dots, the under side of the hind wings being varied with gray. Most of them inhabit the Arctic regions; but one species is found in the Alps, another on the steppes of South Russia, another in the Himalayas, and several (these latter being the largest in the genus) in the mountains of California. They vary from one and a half to two and a half inches in expanse.

A closely allied insect is the extraordinary *Argyrophorus Argenteus* of Chili, which is uniform bluish silvery above, a coloration almost unique among the *Lepidoptera*. It measures about two inches across the wings.

The genus *Melanargia* contains but few species, and is exclusively Palæarctic. All the species have an unmistakable resemblance to our own marbled white.

This is followed by *Satyrus* (the true types of which are *Megara* and *Mæra*) and some smaller genera, which have recently been separated from it. All the species are Palæarctic, Indian, or Australian, and closely resemble the fulvous Southern varieties of *Ægeria*, or else *Megara*, on at least one surface of the wings, even when the other differs considerably.

Our British species of *Epinephile* will likewise illustrate this genus. Several species allied to *Janira* occur in Western Asia and the Himalayas; the *Tithonus* group appears to be confined to South-west Europe and North Africa. The Chilian species, which have been referred to this genus, probably belong rather to separate genera of their own. There are several conspicuous Australian *Satyrinæ* of

different genera resembling *Satyrus Ægeria*, some measuring nearly three inches in expanse. They have generally a large eye at the tip of the fore wings, and another at the anal angle of the hind wings, though *Epinephile Abeona* has two eyes on the fore wings, that nearest the anal angle being the largest. This species is brown, with a fulvous band across the fore wings, and therefore resembles *Ægeria* less than the other Australian *Satyrinæ* of this group.

[NOTE.—In my last article, *Elymnias* is incorrectly spelled more than once.—W. F. K.]

ON THE PRESERVATION OF LEPIDOPTEROUS LARVÆ BY INFLATION.

By C. H. and H. M. GOLDING-BIRD.

THERE have already appeared in the pages of this magazine some useful papers on the preservation of lepidopterous larvæ by inflation. The method we are now going to describe gives as good results by less laborious means. Unfortunately the colour is not constant with many larvæ, so that an approximation to a natural appearance is the most that can be obtained. It is, therefore, all the more necessary to have command over the position of the insect, so that both stiffness and loss of colour together may not make it quite unrecognizable. We think our plan puts a good deal of power into the hands of the operator, and, as stated already, is in no way laborious, so that both amateur and professional will find pleasure in the process as well as in the results. Over the ordinary means employed (so far as we have been able to learn) it has the advantage (1) of exposing the whole length of the larva to the same temperature at the same time; (2) saving the operator's lungs, since the air is forced in from a pressure-bottle, in which it has previously been condensed; (3) allowing the larva to be placed in its characteristic position; (4) unless any special position is required, two larvæ can be inflated at once.

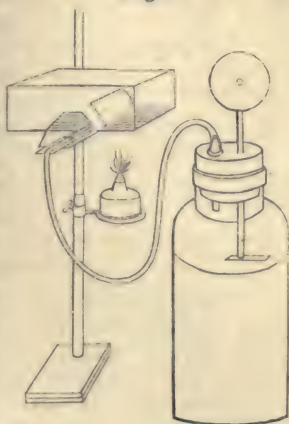
The requisite apparatus can be made by anyone possessed of the most ordinary mechanical skill, in a short time, and at very small expense. After describing it we will give the mode of manipulating a larva from first to last. To introduce

the air into the larva a glass tube, drawn out to a point, is necessary; several sizes should be prepared. This we will call the "spring-tube." It is best made of German hard glass, as it is less liable to accident, and will serve a long time. The size of the tube is not always proportionate to the size of the larva; often a small larva requires a larger tube and more inflation than a large one: thus, *Vanessa polychloros* requires a larger tube than *Dicranura vinula*, and more inflation. The best way to attach the larva to the tube is undoubtedly that described by Mr. Auld in last year's April number of the 'Entomologist,' where a figure of the tube is given; only we recommend but one steel spring, two—one above and one below—being, in most cases, not only unnecessary, but mischievous, as the under spring is apt to force the last pair of prolegs out of their place, and perhaps to break them off. However, this can be left to the fancy of the operator. The steel spring can be fastened to the tube by simply binding the two together with thread and securing with sealing-wax.

The oven in which the larva is baked is made out of a one-pound Colman's mustard-tin, prepared in the manner shown in the woodcut (fig. 1). Draw a knife along the soldered junction of one of the broad sides with the bottom, and then up on both sides from the extremities of the first incision towards the lid for rather less than two inches; the flap thus cut must be turned up into the cavity of the box to an angle of 45° , as the dotted line indicates. A second opening must be made in one of the narrow sides, of the shape and in the position shown: begin it two inches from the bottom of the box, close against the flap above mentioned; it should measure two and three-quarter inches across at its lower part, and one and a half inch above; its height should not exceed one inch and a quarter. The piece of tin removed from the hole, and still retaining its connexion with the box, should be turned down into the horizontal position, so that it may serve as a slab on which to rest the cork tray that carries the larva, and which is pushed into the opening. It is also a great convenience to have a piece of glass let into the lid, so as to admit more light. When in use the box is to stand on the broad side that has the first-described hole in it; it should be placed on a tripod or small retort-stand,

or if these are not to be had it can be balanced on a brick standing on end. It is essential that the part of the box in which is the first hole should project free of the support, so that the flame of the spirit-lamp (or gas jet) that gives the heat may enter the aperture. If gas be employed a Bunsen's burner, turned low, should be used. It will be understood that a larva put head first into the pyramidal, or second hole, will be exposed *along its whole length at once* to the heat of the flame that is burning in at the first hole, while the flap of tin that was turned upwards into the box not only prevents scorching, but equally distributes the heat all along the breadth of the oven. The sizes given for the apertures are found the best for this sized

Fig. 1.



oven, and had best be carefully followed. To suspend the larva by its tail in a vertical position, with the flame just beneath it, as shown in the figure accompanying Mr. Auld's paper, before referred to, is, we believe, a miscalculated procedure, for surely the "head and shoulders" would be singed before the tail was half dry; also in the summer weather, when larvæ are easy to obtain, it could hardly be agreeable to spend an afternoon standing with one's face bending over the flame of a spirit-lamp.

We will now describe the pressure-bottle, by means of which the air is forced into the larva. Obtain a strong bottle of not less than twenty ounces (one pint) capacity, about an inch and a half across the mouth: these can be bought at any chemist's; certain drugs are sent out in them from the wholesale houses. Get an india-rubber cork, exactly fitting and bored with two holes; into one of these holes a piece of glass-tubing three inches long is inserted (this is the "delivery tube"), and into the other a similar piece of glass tube, only double the length, so that it may project freely into the cavity of the bottle, and rise free of

the first tube above the cork outside. The end in the bottle is filed or ground flat, and then, with sealing-wax, fastened on to a small plate of metal (tin or zinc) of the exact size and shape shown in figure 2. This piece of zinc is bored

Fig. 2.



with a hole one-eighth of an inch in diameter, at a quarter of an inch from one end (as shown in the woodcut); the edges of the hole must then be smoothed down perfectly by rubbing the metal up and down a hone or piece of slate a few times. It is exactly over this hole the glass tube is fastened, so that there will be a free passage for the air through both, the junction of the tube and metal being rendered air-tight by the sealing-wax. Now fasten by its narrow end (in the position shown by the dotted line in the woodcut) a slip of thin gutta-percha tissue, or, still better, of oil-silk, by means of any cement, so that the broad end shall freely play over the hole; a valve opening inwards is thus made. To test the valve, suck at the free end of the tube, and if no air passes the valve is good; if any can be sucked through, it is useless, and a new one must be made. The causes of failure would be either using too stiff a piece of gutta-percha or oil-silk, or pieces that have fine holes in them, or else the valve-hole in the metal has not its edges smoothly ground down. By attending to these details anyone can soon construct a valve. The reason for using the india-rubber cork is that an ordinary cork (unless *very* sound) is not air-tight to the pressure of air employed, while if rendered impervious by the use of sealing-wax it could not be removed to clean or renew the valve. These corks, already bored, may be had at any chemical apparatus manufacturers,* and are most convenient, as they can be removed at pleasure. If the cork be now placed in the bottle with its tubes fitted in, and if the delivery tube be stopped up and air be forced in by the mouth through the valve, it will remain in the bottle if the valve be sound, rushing out with a small explosion only on opening the delivery tube. Strong though the puff of air

* E.g., Messrs. Mercer and Townsend, Bishopsgate Street, London.

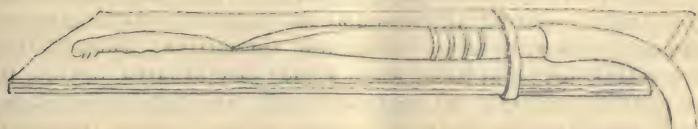
thus given seems, it is quite insufficient for the purpose in hand, and a far greater degree of pressure than can be obtained from the operator's lungs is requisite. To obtain this get a child's india-rubber ball, not under two inches in diameter; if it has a hole already in it bore another at one side with a hot wire, of rather more than the size of a crow-quill; should there be no hole at all two must be made, one at the pole of the ball, the other at its equator. These balls usually contain a good deal of sulphur in powder. After making the holes squeeze out all this powder, as far as you possibly can, or else the valve will be rendered useless by the powder falling on it. It is a good plan to push a little cotton-wool into the upper part of the glass tube bearing the valve; it filters the air as it passes down. Now push the ball by one of its holes on to the glass tube that bears the valve, and if not fitting accurately to the tube a little cobbler's wax will make it do so. If now the ball be pinched between the thumb and finger, the thumb being placed over the second hole, the air in the ball is bound to enter the bottle, while on removing the hand the ball again expands, air entering it by the hole that was just before closed by the thumb. The air in the bottle cannot be sucked out again by the ball, because of the valve; and so, by repeating the process, the bottle can be charged even to bursting, unless of good glass. Complicated though this description of the apparatus has been, it can all be made in less time than the account has taken to write; while the advantages it offers over air-pressure from the lungs are incalculable. To some persons, inflation of many larvæ in one day by the chest might be a serious evil; while to all it must be a very wearying, uncomfortable process; and since the air must of necessity be injected in an intermittent manner, the larva would be longer drying. With the exception of two or three feet of india-rubber tubing, every entomologist would have the remaining needful materials by him,—such as pins, cork, forceps, &c.

To prepare the larva, the following method is recommended:—Kill it in the cyanide bottle, or more speedily render it insensible with a few drops of chloroform; then, with a fine needle thrust in at the tail, stir up the viscera carefully, so that the needle may not pierce the skin, though even this seldom quite spoils it; now lay it on some

blotting-paper or soft rag in a straight position, and roll it firmly with a piece of glass tube, from head to tail, till all the contents are evacuated. It is best to begin rolling about the middle of the larva, for if the contents are driven too suddenly towards the extremity there is danger of bursting the skin: it is also to prevent this that the fine needle is first introduced. Traction with forceps on the extended viscera aids the process. When empty, the skin, which is now shapeless and shrivelled, must be taken in the left hand, and the aperture at the extremity opened fully with the forceps; the nose of the spring-tube is now introduced for a short distance, sufficient to allow the piece of watch-spring just to catch the tip of the anal flap; on blowing gently into the tube the skin will rise into shape, but will collapse instantly on ceasing the inflation. If the tube be very small, or the aperture in the animal large, the disproportion will allow of such an escape of air by the side of the tube that either the skin will not properly inflate or only do so by blowing fiercely. The happy mean in this, as in all things, can only be hit off by experience. The last segment may be pressed to the tube, and so made to fit closely enough. Indeed, it is no advantage to have an exact fit; some escape is desirable, so as to act as a safety-valve, and prevent the over distension of the specimen; occasionally it is well to prick the thin skin connecting the 2nd segment with the head, to prevent the latter being unnaturally forced forward. All being so far prepared, slip one end of the india-rubber tube over the free extremity of the spring-tube, and the other over the delivery tube of the pressure-bottle; now press the ball, and the skin will expand; and if the right balance between the size of the spring-tube and the aperture in the larva has been hit off, the skin will remain inflated with occasionally squeezing the ball. Light the spirit-lamp and put it in its place (higher than in the woodcut), so that the flame shall enter the opening in the box; lay the skin, attached of course to the spring-tube, on a flat piece of cork—the “tray,” and fasten it by an elastic band, as shown in figure 3; now put the cork into the oven, so that the larva lies well inside, and with a wooden American clip (clothes-peg) secure the side of the cork to the slab of tin that projects from the opening; continue the inflation, watching the degree to which the skin

is to be inflated; and in a few minutes the operation is completed. The exact amount of time and heat required are points on which we can only say, "Experientia docet." The head of the larva always dries last, so it is easy to tell if it is

Fig. 3.



quite done by touching the head or first pair of legs with a needle; if they move in the slightest the larva must go in again. Sometimes on raising the spring the larva will fall off without trouble; more often it sticks to the tube, and can only be removed by softening the last segment with a little water dropped from the end of a match: the larva can then soon be got off with the help of a needle; the superfluous water must be taken up at once with a little blotting-paper, and the flap closed down; put the larva on the cork, tail foremost, and let it remain in the oven a few moments to dry off the moisture. Attention to these details is specially urged, as we have seen otherwise good specimens spoiled by the distended aperture in the tail, which, while it gives a good view of the thorough cleansing the skin has undergone, can hardly be called desirable. Fortunately larvæ have a tendency to take the position natural to them: a *Noctua* could hardly be made to loop, while a *Geometer* can readily be fixed in its characteristic position with the help of a few short pins. *Geometers* are best laid sideways on the cork, if it is wished to arch them; indeed, any larva that is to be specially posed is best laid sideways. The larvæ must each be dried separately if they are to take a particular position, otherwise there is nothing to prevent inflating two together, the air-pressure being more than sufficient. To connect them with the india-rubber tube, have a piece of metal made at a tinman's of the shape of the Y used for butterfly-nets, only much smaller: it must be made hollow, so that by blowing in at the stem the air will pass out at each of the branches; the thickness of the metal should be such that it will fit

firmly into the india-rubber tube; the weight of the metal is a disadvantage; the Y would be better made of india-rubber.* To each of the branches attach about a foot of india-rubber tubing, and at the free end of each tube fit the spring-tubes, each holding a larva; these will lie side by side on the cork tray and dry together.

Mr. Auld has already described how larvæ should be mounted,—each on its particular food-plant; mounting upon straws looks very neat, but is not suggestive. Should the apparatus not be at hand when some special larva occurs, it is possible, though not recommended, to prepare the skins and put them by in cotton-wool, relaxing them in warm water later. If this be done the skins should be rolled very smoothly, or they will contract unevenly, and not expand in a satisfactory manner afterwards. We have not tried this with hairy larvæ. Perhaps a drop or two of glycerine mixed with water and injected into the skins would be a good plan, as it would prevent their drying up, only then the glycerine would have to be removed by syringing with warm water before they are baked, or the skins would not dry. For beginners it would be disheartening to set to work on a larva which even one accustomed to the work could not turn out to his own satisfaction. In their seasons *Abrazas grossulariata*, *Mania typica*, *Orthosia ypsilon*, and *Nyssia zonaria*, are easy to work upon; but this is foreign to our purpose now, as is also the preservation of colour. We will only add that larvæ are best chosen a few days after their last moult. The presence of ichneumons in the larvæ does not unfit them; though occasionally, if they have crawled out, the skin will be distorted.

It requires a good deal of resolution to kill a choice larva, especially when you would like it to figure in your cabinet as a perfect insect (an instance of one of the many cakes that we cannot both eat and keep); but then, when the die is cast and the skin rolled out, how great is your satisfaction when you dislodge some scores of ichneumons, of whose existence you had had no suspicion; and you rejoice both in "doing" the ichneumons, and in preserving as a larva what

* This can be easily done by cementing three pieces of india-rubber tube in the required position with gutta-percha dissolved in chloroform or bisulphide of carbon.

would never have been a moth. We can speak feelingly, having had this experience only to-day. When young larvæ differ very much from the adult form, it is desirable to preserve them before they have lost their early markings. In this stage they require especial care, as the tender skin is liable to swell unnaturally. Small larvæ, requiring a very fine tube, can often be attached without the use of a spring, simply by pressing the skin carefully to the tube, and letting it stand a minute before inflating. In this case there is rather more trouble in getting the larva off the tube; it should, therefore, be pushed in only just far enough to hold it firmly. Avoid fingering the larvæ skins more than absolutely necessary; it is apt to rub the hairs off the hairy larvæ, and bruise the skins of the smooth; forceps should in this case come before fingers. *Liparis chrysorrhœa* does not turn out so well as some; but even this dreaded larva can be managed with so little contact with the fingers that the operator will probably escape without suffering pain from the barbed hairs. Anyone who has spent an afternoon in the society of *Cossus ligniperda* will be astonished to find how much can be done with very little fingering. It would of course be a great saving of time to have both hands at liberty during the drying: this could be managed by dispensing with the ball, and connecting the free end of the valve-tube with the nozzle of a pair of bellows by a piece of india-rubber tubing; the bellows could be worked with the foot; a spring should be inserted between the handles to make them open again after compression.

We hope the explanations given have been sufficiently clear to put one who has never attempted the work into the way of doing it satisfactorily, and certainly at little cost; whilst those who are skilled will perhaps be glad to practise a simple and harmless mode of inflation. The pressure-bottle is not a new invention, though newly applied and somewhat modified: it is used by microscopists for injecting small animals.

We now end with a caution and an apology: for the former—when you are about to uncork the bottle be careful not to strike the plate of metal against the side of the bottle, or you will injure the valve, and perhaps break it; for the latter—we must greatly have offended entomological ears by

using the word "tail," instead of speaking of the "12th and 13th segments," or the "posterior extremity;" it was done for the sake of brevity, and not in disregard of the grammar of the Science.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 209.)



Fig. 71.—*S. TRICOLOR*.



Fig. 72.—*S. ALBIPES*.

71. *Spathegaster tricolor*, Hart.—Although at the first glance it is easy to separate *S. tricolor* from *S. baccarum*, still the galls are much like one another. The gall of *S. tricolor* is also round, also contexturate with the leaf, very sappy, and attains at most to a diameter of but 4·6 millimetres, and is covered, though not thickly, with fine, soft, simple, very rarely branched, hairs, of from 1 to 2 millimetres in length; the periphery of the gall is often disturbed by small conical projections. The disk on the under side of the leaf of *Quercus sessiliflora*, on which the gall occurs, is smaller and less arched than in the gall of *S. baccarum*. The figure is taken from specimens preserved in spirit, which Herr v. Schlechtendal had the kindness to send me. The fly appears, according to the same authority, in the first fortnight of July, whilst the gall may be found in May.—G. L. MAYR.

This species is at once distinguishable from the former by its hairiness, as in Britain the pubescent galls of *S. baccarum* are unknown, owing to the absence of *Quercus pubescens*. I

have found it in many localities, but nowhere abundant; and it is not recorded from Scotland. Rev. T. A. Marshall, who described it (*teste* Parfitt) as the production of *N. fumipennis*, speaks of it as "exceedingly common near London" (E. M. M. iv. 146): like *S. baccarum* it may occasionally be found on the upper side of the leaf. As inquiline of this gall Dr. Mayr gives *Synergus albipes*, H., *S. facialis*, H., and *S. thaumacera*, Dalm., all appearing in June and July of the first year. Of parasites Mr. Rothera has bred a *Eurytoma*, a *Callimome*, and a *Pteromalus*; these all in July.—E. A. FITCH.

72. *Spathegaster albipes*, Schenck.—This small gall—rare in the neighbourhood of Vienna, but common in Saxony and Nassau—is somewhat similar to those of *A. burgundus*, Gir., and *A. circulans*, Mayr; it may be found immediately after the appearance of the leaves of *Q. sessiliflora*, either at the margin or on the midrib of the leaf: in the latter case the leaf becomes crumpled, and is sinuate to the midrib; very rarely it may be found on the petiole. It is greenish yellow, subsequently yellow; elongately oviform, with a longer axis of 2 millimetres long by 1 broad, generally bordered with little protuberances on the free side opposite the line of attachment; its surface is hairy when immature, later on it is mostly bald. With the help of a strong glass we may see the rounded cells of the gall (which Prof. Schenck has described as very small protuberances). The section shows that this gall has only a thin cellular wall and a relatively large chamber for the larva, which appears in the perfect state in the middle of May.—G. L. MAYR.

This gall, which is figured by Malpighi, has been recorded as British by Mr. Cameron, who thus speaks of it:—"I find it commonly around Glasgow. The very small size of the gall renders it easy to be overlooked" (E. M. M. xiii. 200). Schlechtendal says "this species is intermediate between *Andricus* and *Spathegaster*, both as regards the structure of the fly itself and of its gall;" and then remarks on the similarity of its gall to that of *A. curvator*. There might be some evidence here for Mr. Bassett. Dr. Mayr received *Synergus apicalis*, H., as bred by Schenck, from this gall; but he thinks it more probable they were connected with *Noduli* galls.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

COLIAS EDUSA; A SECOND BROOD.—This year of 1877 will be known amongst entomologists as “the great *Edusa* year;” for following the abnormal first brood of this butterfly, which appeared in unusually large numbers in June last, there is now occurring a second brood, after a distinct interval of disappearance of the imagines in the middle of July. During this August *Colias Edusa* appears to have occurred in profusion in most districts visited by collectors throughout England. Nor has it been confined to its usual haunts. It has been frequently observed in suburban gardens, and even in the crowded streets of London, and other large towns. As it is impossible to print all the contributions—which exceed one hundred—received on the subject of *Colias Edusa*, I must content myself by thanking our correspondents for their attention, and ask them to accept the apology of “want of space” for not inserting their notes. This second brood of *Colias Edusa* dates from about July 25th, when odd examples were found; but July 30th appears to be the first day upon which it is reported as very common. As regards *Helice*, the notes of its capture show it to be very widely distributed, and in varying proportion to *Edusa*. One *Helice* to seven *Edusa* seems to be the largest number recorded. Probably at the end of the season a special article will appear on this subject, with a tabulated list of observations on the appearance of *C. Edusa*.—JOHN T. CARRINGTON; August 22, 1877.

ABUNDANCE OF COLIAS EDUSA.—I send herewith my experience of the abundance of *C. Edusa* this year, as I think the more notes that can be collected on the subject the better. All I have observed here in previous years have been two specimens in October, 1869. This year, on coming down here at the end of July, I heard they had been seen more or less all the summer; but whether hibernated specimens or not I am unable to ascertain. On July 30th and 31st I found them abundant in a large, rough meadow; and individuals were, and are still to be, met with everywhere. On both the above-mentioned days I saw a pair *in cop.*; and all the specimens I took, except one or two, were beautifully fresh,

evidently just out. There are still plenty about, only of course more worn. I may mention that wherever I have been this year I have seen specimens. On June 11th I saw one at Wormwood Scrubbs during the Middlesex Rifle Meeting.—WALDEGRAVE; Bookham Lodge, Cobham, Surrey, August, 1877.

VANESSA ANTIOPA AT NORWICH.—On August 18th a friend of mine saw a specimen of *V. Antiopa* in a street in this city, but was unable to capture it.—R. LADDIMAN; Norwich.

VANESSA ANTIOPA IN THE ISLE OF WIGHT.—I should like to record in the 'Entomologist' the capture of a good specimen of *V. Antiopa* in a field near Shanklin, Isle of Wight, on the 6th of August.—R. OAKESHOTT; 161, Sloane Street, S.W., August 23, 1877.

SPHINX CONVULVULI LARVA.—I received the other day a fine larva of *S. convolvuli*. Within twenty-four hours after obtaining it, it buried in the earth at the bottom of the breeding-cage in which I had placed it. I had only time to compare it with the very complete description given by the late Edward Newman in the 'Entomologist' (Entom. viii. 272).—J. B. PILLEY; 2, High Town, Hereford, August 23, 1877.

ACRONYCTA ALNI AT THREE BRIDGES.—I joined the South London Entomological Society's annual excursion (for Tilgate Forest) on Monday, August 6th, and spent a few hours in the forest. A small larva beaten off birch fell into my net, resembling very curiously a bird's dropping, having the anal segments of a dirty white colour, the anterior segments being blackish with whitish markings. When at rest with the head turned back its appearance was fully calculated to deceive a casual observer, and probably also its natural enemies—the birds. The larva was quite unknown to my fellow-members; and though I was disposed to think it might belong to *Acronycta alni*, simply from the fact that it was evidently an *Acronycta* and was different to the commoner species of that family, this idea received no support. On the following day my larva cast its skin without undergoing any noteworthy change in its appearance, except that it had a pair of long hairs near the head and shorter hairs on the body. The curious resemblance to the bird's dropping was as before. After this moult the larva fed well upon birch for five days, when it spun a web on a birch leaf and prepared to moult

again. This change I anxiously watched; and on the 14th inst. I had the pleasure of observing the most wonderful transformation in the appearance of a larva that I have ever witnessed. It is now veritably *A. alni*. It has lost all traces of dirty white markings; its ground colour is a beautiful black, and the usual conspicuous yellow markings are very striking, being uniform throughout, while the long clubbed hairs on each segment give it somewhat the appearance of a centipede. My larva is now (August 16th) feeding well upon birch. In 1874 I found a larva of *A. alni* in the New Forest, which produced a fine imago the following year; but it was full fed at the time that I found it, and I could not tempt it to eat.—J. PLATT BARRETT; 34, Radnor Street, Peckham.

ACRONYCTA ALNI.—I captured a larva of this species at Seven Oaks, on the 12th inst.—T. LOVELL; August, 1877.

DORYPHORA DECEMLINEATA.—I have had much practical acquaintance with the Colorado potato-bug in Canada, where every year it appears on my farms. I do not consider there is any need for panic in this country, even if it does become a colonist. I have successfully caused its almost total suppression each year on my land by the liberal use of Paris green (arsenite of copper), although every season it reappears in equal numbers. Two applications of a solution of this chemical poison has always been, in my experience, effectual. I have it applied wet now, although I once tried it as a dry powder when the dew was on the haulm; but this was very dangerous, causing illness to the workmen who inhaled the powder as it blew about with the wind. I quite disagree with the *savants* of the British Association and others who consider this climate too humid for its development, especially during hibernation. In Canada I have dug them out of the mud, which was knee deep, in the spring of the year. This was in low ground, and before the higher table-land was thawed out. I have even kept them as an experiment in water; but when taken out and placed in the sunshine they soon revived, seemingly none the worse. Once, while on a visit at Chicago, I saw them crawling on the docks in countless numbers: the water had been covered with them for weeks. I took some of these apparently lifeless insects out of the dock and put them where the sun shone on them, when they shortly crawled away. In Canada, generally, comparatively little damage has been done by the beetle, on account of careful

farming and the use of Paris green I anticipate that should it effect a settlement in Britain the damage will be greatest where there is careless farming.—G. A. FARINI; Royal Aquarium, Westminster, August, 1877.

AN ACT FOR PREVENTING THE INTRODUCTION AND SPREADING OF INSECTS DESTRUCTIVE TO CROPS.*

I.—The Lords and others of Her Majesty's Most Honourable Privy Council (in this Act referred to as the Privy Council) may from time to time make such Orders as they think expedient for preventing the introduction into Great Britain of the insect designated as *Doryphora decemlineata*, and commonly called the Colorado beetle. Any such Order, if the Privy Council think fit, may prohibit or regulate the landing in Great Britain of potatoes, or of the stalks and leaves of potatoes, or other vegetable substance, or other article, brought from any place out of Great Britain, the landing whereof may appear to the Privy Council likely to introduce the said insect into Great Britain, and may direct or authorise the destruction of any such article, if landed. If any person lands or attempts to land any article in contravention of any Order under this Act, such article shall be liable to be forfeited in like manner as goods the importation whereof is prohibited by the Acts relating to the Customs are liable to be forfeited; and the person so offending shall be liable, according to those Acts, to such penalties as are imposed on persons importing or attempting to import goods the importation whereof is prohibited by those Acts.

II.—The Privy Council may from time to time make such Orders as they think expedient for preventing the spreading in Great Britain of the said insect. Any such Order may, if the Privy Council think fit, direct or authorise the removal or destruction of any crop of potatoes or other crop or substance on which the said insect in any stage of existence is found, or to or by means of which the said insect may appear to the Privy Council likely to spread, and the entering on any lands for the purpose of such removal or destruction, or for the purpose of any examination or inquiry authorised by the

* Legislation on entomological subjects in this country being very exceptional, it may be well to quote the above extracts from the Act of Parliament, passed August 14th, 1877. The portions left out are purely technical, and uninteresting to the general reader.—ED.

Order, or for any other purpose of the Order. Any such Order may, if the Privy Council think fit, prohibit the keeping, selling, or exposing or offering for sale, or the keeping of living specimens of the said insect, in any stage of existence, or the distribution in any manner of such specimens. Any such Order may impose penalties for offences against the Order, not exceeding ten pounds for any offence; and those penalties shall by virtue of this Act be recoverable, with costs, on summary conviction before two justices of the peace, and shall be applied as penalties recovered under the Contagious Diseases (Animals) Act, 1869, are applicable.

III.—Where by any Order under this Act the Privy Council direct or authorise the removal or destruction of any crop, they may direct or authorise the payment by the Local Authority of compensation for the crop; and the Local Authority shall pay the same, subject and according to the following provisions:—1. In the case of a crop on which the said insect, in any stage of existence, is found, the compensation shall not exceed one half of the value of the crop. 2. In every other case the compensation shall not exceed three-fourths of the value of the crop. 3. The value of the crop shall in each case be taken to be the value which, in ordinary circumstances, the crop would have had at the time of its removal or destruction. 4. The Local Authority may, if they think fit, require the value of the crop to be ascertained by their officers or by arbitration. 5. The Local Authority may, if they think fit, withhold compensation if, in relation to the crop, the owner or the person having charge thereof, has, in their judgment, done anything in contravention of, or failed to do anything in compliance with, any Order under this Act.

IV.—The Local Authorities under the Contagious Diseases (Animals) Act, 1869, with their respective districts, local rates, clerks, and committees, shall be in like manner Local Authorities for the purposes of this Act. The Privy Council may, if they think fit, require a Local Authority to carry into effect any Order of the Privy Council under this Act. The expenses incurred and compensation paid by a Local Authority in pursuance of any Order under this Act shall be paid by them out of the local rate.

This Act may be cited as The Destructive Insects Act, 1877.

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STRENIA CLATHRATA.



STRENIA CLATHRATA (varieties).

THE two interesting varieties of *Strenia clathrata*, figured above, are from specimens in the collection of Mr. Stevens. They were originally in the collection of the late Dr. Harper; but the precise locality of their capture is not known. The figures are drawn by Mr. Willis, and engraved by Mr. Kirchner.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. IV. NYMPHALIDÆ—SATYRINÆ.

PART II.

THE genus *Hipparchia* is Palæarctic and North American, being perhaps best represented in Western Asia. All the American species belong to the same group as the European *H. Phædra*, and are dark brown, with two black eyes with

blue pupils on the fore wings; sometimes these are placed on a fulvous or tawny band. In the *Statilinus* group the eyes are smaller, and have often two white dots between them; and this shades into the *Semele* group; and this again into the *Briseis* and *Circe* groups, where there is a white or yellowish band, more or less divided by the nervures, across both wings. Three or four North Indian species, closely resembling *Circe* in appearance, have been separated under the generic name *Aulocera*. Two of the most interesting *Hipparchiæ* from Western Asia are *H. Bischoffi*, in which the hind wings are fulvous, and *Parisatis*, uniform brownish black, edged with bluish white.

Mycalesis is a large genus, to which most of the smaller *Satyrinæ* from Africa, Asia, and the Australian Region, belong. They are usually brown, but sometimes fulvous, yellowish, white, or even purplish. (I forgot to mention before that many dark-coloured *Satyrinæ* exhibit a bluish, purplish or greenish lustre in some lights. This is very conspicuous in some of the European species of *Hipparchia* and *Maniola*.) *Mycalesis* usually exhibits more or less of a marginal row of eyes; but the most conspicuous, and often the only one visible above, is usually that nearest to the hinder angle of the fore wings. There is usually a transverse pale line running across all the wings beneath, within the eyes. These insects are usually about the size of *S. Janira*; but the genus *Ypthima*, and its allies which follow, are seldom much larger than *Cænonymphæ*. Their range is similar to that of *Mycalesis*, but they may be at once distinguished from it by their uniform brown colour, with a black eye in a yellow ring near the tip of the fore wings, always enclosing two white pupils. There is usually a variable number of eyes on the hind wings, most numerous beneath.

After this genus comes *Heteropsis*, a small dark brown butterfly from Madagascar, remarkable for the produced tips to the fore wings.

The genus *Cænonympha* is European and Californian; the Californian species are paler than ours. The South Russian *Triphysa Phryne* is remarkable for the disparity of the sexes; the male is brown, and the female dirty white; the under surface has conspicuous white nervures.

Cænonympha is replaced in Australia by *Hypocysta*, which resembles it in size and colouring, but has two eyes on the hind wings, at least below; and occasionally on the fore wings also. One species, *H. Osyris*, is brown, with the centre of the wings filled with white instead of tawny, and a very large black eye in a yellow ring, and bipupilled with white at the anal angle.

Eteona-Tisiphone is a South American butterfly, measuring nearly two inches across. It is brown, with the centre of the hind wings and sometimes part of the fore wings filled up with straw-colour, divided by the nervures into spots; the under side is much paler, and the oval spots form a band across both wings, giving the insect very much the appearance of *Archonias*, a genus of *Pierinæ*, under which it was originally described.

Lymanopoda contains some South American species, about one and a half to two inches in expanse. The wings are usually reddish brown, with a pale stripe or row of spots across the hind wings beneath. Some species, however, are whitish above; and others have the pale stripe absent, and the veins beneath black.

Calisto includes a few small species confined to the West Indies and the adjacent parts of America. They are black or brown above, sometimes tinged with reddish, and have a large eye (sometimes bipupilled) at the tip of the fore wings beneath, and a smaller one on the hind wings. This genus, like the last, has the wings entire.

Zipætis, the last Old World genus of the family, has some resemblance to the *Elymniinæ*. It contains two Indian species. *Z. Saitis* is over two inches in expanse, brown above, with a white transverse band across the fore wings, and a submarginal band on the hind wings, dentated on the outside, as is the hind margin itself; under side similar, but with four eyes on the hind wings, the two largest being inside, and separated by an interval; one of them is bipupilled.

The three species of *Steroma* vary from one and a quarter to two and a quarter inches in expanse. They are brown or black insects, with the outer margins much indented, and with a conspicuous indentation on the inner margin of the hind wings, near the anal angle; the under side of the hind

wings is dark brown, sprinkled with metallic scales, and a more or less complete marginal row of metallic dots.

The genera *Pedaliodes*, *Gyrocheilus*, *Oxeoschistus*, *Lasiophila*, *Dædalma*, and *Pronophila*, contain large and handsome insects, measuring two or three inches in expanse, and chiefly confined to the mountainous districts of Western America.

Pedaliodes may be distinguished from *Lymanopoda* by the dentated hind wings, and from *Steroma* by their entire inner margin. Many species resemble these genera in markings; others are striped or banded with white and fulvous.

Gyrocheilus Patrobas is a Mexican species, with smooth eyes; the other allied genera have them hairy. It is two and a quarter inches across; brown; the fore wings with four white dots, surrounded with black below; and the hind wings with a red marginal band.

Oxeoschistus has strongly dentated hind wings; the species are fulvous beneath, with pale transverse lines more or less conspicuous; some are brown above, with a broad submarginal fulvous band enclosing black spots; another is dark brown, with a very large pale blue spot, dentated externally, on the outer half of the hind wings.

Lasiophila and *Dædalma* are much dentated, the hind wings often with a short tail. The former is reddish above; the fore wings brown towards the margins, spotted with red, and the hind wings either similar, or red, bordered with brown, and with a row of brown spots on the outside of the red portion. *Dædalma* is usually brown above, sometimes with submarginal pale spots; the under side of the hind wings is marbled with greenish or reddish, with traces of a central row of eyes.

The species of true *Pronophila* resemble each other closely. They are all large dark-brown insects, occasionally with some white spots near the tip of the fore wings, above as well as below. On the under side they have three or four conspicuous black eyes, with blue pupils on the fore wings, and sometimes a row of smaller ones on the hind wings.

The species of *Taygetis* vary from two to four inches in diameter, and are found in most parts of Central and South America. They are brown above, occasionally with fulvous

markings towards the hind margin of the fore wings, or a fulvous border to the hind wings, which are moderately dentated; the under side is paler, generally with two transverse lines, outside which runs a row of eyes, often reduced to pale dots. One species (*T. Mermeria*) has very acute tips to the fore wings.

The species of *Corades* chiefly inhabit Western South America. The hind wings are not much dentated, but are produced at the anal angle into a short tail. The species are nearly three inches in expanse, dark brown; the fore wings sometimes spotted on one or both surfaces, and the hind wings above washed with fulvous; the under side of the hind wings is generally crossed by at least one transverse line.

The Brazilian *Bia Actorion*, which is often referred to the *Morphinæ*, should perhaps form a subfamily by itself. It is a brown insect, about two inches in expanse, with a curving, transverse, fulvous band near the tip of the fore wings, and a bright purplish blotch on the outer half of their inner margin. The male has a conspicuous tuft of hairs on the inner margin of the hind wings, which are produced into a short tail at the anal angle; the under side is brown, covered all over with short yellow stripes, and dusted on the hind wings with bluish; on the hind margin of the fore wings, towards the tip, is a black eye in a yellow ring, with a blue pupil; and there are one or two yellow spots near the costa of the hind wings.

A Catalogue of the *Satyridæ* in the British Museum, by A. G. Butler, was published in 1868; and the most important monographs of separate groups are those by Butler, on *Euptychia*, in the Proceedings of the Zoological Society for 1866 and 1867; and by W. C. Hewitson, on *Pronophila* and *Ypthima*, in the Transactions of the Entomological Society of London, ser. 3, vols. 1 and 2.

GEOMETRA PAPILIONARIA.—I caught a specimen of this beautiful insect at rest on a lamp, on August 12th. I have collected for some time in this neighbourhood, and have never seen a specimen of this insect here before.—G. R. PIGG; Withington, Manchester.

TURNIP AND CABBAGE-GALL WEEVIL, CEUTORHYNCHUS SULCICOLLIS.

By E. A. ORMEROD.

Fig. 1.



Fig. 3.



Fig. 2.

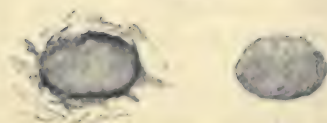


Fig. 1.—A, B, C. Jaws of the cabbage, turnip and swede turnip weevil larva, respectively.

Fig. 2.—The earth cell of the *C. sulcicollis* pupa, and the cell in its chamber, both magnified.

Fig. 3.—A cabbage root, with galls of *C. sulcicollis*.

THE *Ceutorhynchus sulcicollis*, or turnip-gall weevil, is, perhaps, of no very great importance in its attack on turnip roots, as except when in unusual quantities the galls it gives rise to can be used for sheep food like the rest of the root, though the quality of the bulb suffers materially. With the cabbage it is a different matter, here its attack is sometimes a serious injury; and the enormous extent to which it exists in some of our cabbage-growing districts, both in England and Ireland, make its habits of some degree of interest.

The small, black-gray weevils, scarcely more than a line in length (and from their habit of feigning death when alarmed, eluding all but the most careful search), are well known, and appear in the specimens I have reared from larvæ taken out of galls on the cabbage or common white turnip roots, to be exactly similar in both cases. The pupæ, also, have precisely

the same form of earth cells, and the larvæ are similarly thick, legless, corrugated grubs, their heads furnished with strong jaws ochre-coloured, shaded to dark chestnut at the tips, and armed with two well-defined teeth, and a third much smaller one (fig. 1: A, cabbage larva; B, turnip larva), sometimes little more than a tubercle on the inner side. The only difference observable was a rather more ochreous tint in the grub from the turnip than in that of the cabbage, which was almost white; and in the *Ceutorhynchus* larvæ from galls of swede turnip the general colour was more ochreous still, conjecturally, in both this and the white turnip from the nature of the food. Here, however, there was a slight structural difference, for the third tooth or tubercle on the jaws was absent from the larva of the swede weevil in the specimens I had for examination, and the teeth themselves were smaller (fig. 1: C, swede larva), and obtuse at the extremity. They formed their earth cases for pupation about the same distance below the surface as the others, but development, from some unknown cause, did not proceed, so that I had no perfect beetles of these for comparison.

The cabbage and white turnip grubs appear very indifferent to interference: on the galls being opened, whether apparently fully grown or not, they almost invariably buried themselves at once in any earth they might be laid upon; and if in a few days their earth-cases were broken into for examination they would reconstruct them. These cases were about an eighth to three-sixteenths of an inch long, obtusely oval, though somewhat irregular in shape, and lying loose in the hollow chamber from which their materials had been taken (like a dry kernel in a nut-shell). The nature of the structure varied a little with that of the surrounding materials, being chiefly of earth, with a few minute pebbles adhering in the case of the turnip larvæ, and with the addition of a little vegetable matter in those of the cabbage (fig 2: cell, and cell in its chamber, magnified). With the cabbage grub the case was sufficiently advanced to cover a quarter of its length two days after it had buried itself. The method of procedure appeared first a commencement at the tail end, then holding on by the caudal extremity to this growing structure, so that if disturbed it still carried its partly-formed husk with it. The larva gradually built its earthy covering onward around it,

moistening it so plentifully as to show wet patches on the inside from time to time as the work proceeded. When complete the case was smooth inside, with a lining of whitish or yellowish gummy material, and externally the slightly rough earthy surface sometimes showed faint concentric rings from the regularity with which the grub had built the structure onward, and a depression at one extremity from the closing aperture preventing the tenant reaching out for further supplies of material. The time occupied from the disappearance of the larva to the appearance of the developed beetle was, both in turnip and cabbage, not exceeding two months, never less than about fifty-four days in any of the observations, which were taken about the beginning of summer.

In the case of the cabbage the large abnormal gall growths in themselves do injury by drawing off the plant-juices from their proper objects, and in their great aggregations where they may be found either forming the great masses known as club (fig. 3), or diseased growths indistinguishable from it, they cause loss to the growers; from its different amount of appearance on the ground, when differently managed, in the same neighbourhood, the disease would appear to admit of some remedy.

In looking over the cleared plants in the great cabbage-growing district round Isleworth, I have found heaps, amounting to several cart-loads, in one spot, all badly affected by the weevil-gall, and at the same time another deposit would be almost free. The disease, that is the insect presence, whatever else may promote it, appears steadily to increase in proportion to the degree in which cabbage crops without intermediate change, or with insufficient change between them, are grown on the same spot. One piece of ground, where the cabbage stalks (with whatever weevil-grubs might be in them) were regularly buried on the ground, was well known for the quantity infesting it; on the other hand, in a fair-sized garden, where when first the experiments began the beetle was plentiful, it has now nearly disappeared, before deep digging and new soil.

In an excellent paper on "Anbury," by Mr. Goodiff, of Granard, in the 'Gardener's Chronicle and Agricultural Gazette' for 1853, the presence of the weevil may be traced similarly on a large scale, from growing for wholesale

supplies constantly on the same ground. On a large plot, "which had for several years" been planted with cabbage, the plants suffered severely from the disease (that is anbury, with weevil larvæ contained in it), though they were planted free from it out of the seed bed. At the same time turnips, and about twelve hundred borecoles, planted outside what might be called the "cabbage-sick" spot of ground, escaped; and in a part of this spot, which had been dug "deeper than ever it was dug before," about eight hundred cabbage plants, put in to replace the weevil-destroyed crop, entirely escaped also. The paper is valuable from simply giving a note of agricultural treatment and losses in connection with anbury and weevil presence on a large scale; and, when interpreted by knowledge of the habits of the weevil larva from an entomological point of view, with the absence or presence of the "pest" varying in different places according to persistence or rotation of crops, helps to suggest that with a little care we might be much freer from its injuries than we are at present.

Spring Grove, near Isleworth,
August 7, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 235.)



Fig. 73.—*S. VERRUCOSA*.



Fig. 74.—*S. VESICATRIX*.

73. *Spathogaster verrucosa*, Schlechtendal.—Of this beautiful gall I have five dry types now lying before me. It may be found, according to Schlechtendal, by the beginning of May on the young, sappy oak leaves (presumably of *Quercus*

sessiliflora or *Q. pedunculata*, as no other oak occurs near Zwickau), and stands next to the gall of *Spathegaster flosculi*, Gir. (= *Giraudi*, Tschek.), in form, structure, and pubescence. It occurs on the midrib or on a side rib, is fusiform, 3.5 to 5.3 millimetres long by 2 to 2.4 millimetres broad, and is abruptly and bluntly conical at its extremities; it is greenish yellow, partially rosy, and is said to be blue-green in its young state; it is thickly covered with soft, pustular hairs, which become depressed when the gall is dried; it is thin-walled, and encloses a large larva-cell without an inner gall. According to Von Schlechtendal the fly appears in the second fortnight of May. It is very probable that *S. verrucosa* and *S. flosculi* are the same species, as, apart from the galls being so similar, I am unable to differentiate the flies.—G. L. MAYR.

This is not known as a British species.—E. A. FITCH.

74. *Spathegaster vesicatrix*, Schlechtendal.—According to three typical examples now before me, this gall, which to judge from the specimens of the leaves occurs on *Quercus sessiliflora* or *Q. pedunculata*, appears as a circular swelling of the leaf, measuring from 2 to 3 millimetres in its horizontal diameter, so that the epidermis of the upper side is separated from that of the under side by about 1.3 millimetre; the green or whitish surface of the upper side has in its centre a little conical projection, from which small ribs radiate to the margin of the gall; the surface of the under side is without the papilla, and it is not so regularly ribbed. The larva lives between these two moderately convex surfaces, without being enclosed in an inner gall. One old gall, which is embedded in a brown leaf, is of a brownish yellow colour, has a much harder upper surface, is not transparent, nor does it show any signs of being ribbed; the similarly-coloured under side is quite flat. Since the description of this gall appeared in the 'Stettiner entomologische Zeitung,' 1870, p. 397, Herr von Schlechtendal has bred the fly, of which I have two specimens, at the beginning of June. A similar, though decidedly different, blister-gall I have found on *Q. pubescens*, as well as a second on *Q. cerris*, but have obtained the producer from neither.—G. L. MAYR.

Miss E. A. Ormerod has written me as follows respecting this species:—"I found galls of this species first on *Quercus*

pedunculata, on July 27th, 1873, and noted it as affecting both sides of the leaf; flat on the upper surface, with a blunt central point and ribs radiating from the centre, but only showing near the margin; the gall forming a shiny circular space on the upper side of the leaf, and beneath it the shape is similar, round and somewhat convex. During the following days, up to July 30th, I found a good many specimens; but though a very few were still green, the galls for the most part seemed past their maturity: some were dry, empty, and perforated; and many had the insect contents dead and distorted. On August 1st there were no live *Cynipidæ* in any of them, and from the state of the galls it appeared as if the gall-maker made its escape before the altered cuticle of the leaf died completely. I noted a brilliant green parasite with black striped abdomen; and in one light-brown gall were two of what I conjecture to be inquilines, but had no means then of determining." Dr. Traill has described it thus:—"On Saturday, July 5th (1873), I found galls of this species common in oak leaves, at Bauchory, where I had seen a few about a month before in their earlier stages, without recognising them as galls. This species also is, I believe, new to Britain. They are sunk in the substance of the leaf entirely at first, but as they approach maturity they project both above and below, forming a very low double cone, and enclosing a cavity of some size, the walls being very thin. When mature they are readily seen, being whitish, while the leaf is green; but till maturity they are green like the leaf. They are then very difficult to find, the readiest eye-mark being the radii which pass from a small knob in the centre to the circumference. On the upper surface this arrangement is very regular and distinct, but it is less regular below, and there is no central knob. Both surfaces are naked. The form is oval, about one-eighth by one-twelfth. Almost all that I found were empty, but a few contained inquilines." (Scot. Nat. ii. 171). This gall is probably widely distributed, though unnoticed, in Britain. I have found it at Maldon sparingly, but never bred an inmate.—E. A. FITCH.

S. BRADBURY.—The cottony galls upon the oak are produced by *Andricus ramuli*, one of the *Cynipidæ*.—ED.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

VANESSA ANTIOPA AND SPHINX CONVULVULI IN THE ISLE OF WIGHT.—I took a good specimen of *Vanessa Antiopa*, on September 3rd, with my hand, whilst it was drinking the sap of a partially decayed oak tree, in Puckpool Battery, Ryde. I also took a specimen of *Sphinx convolvuli* at light, on September 16th, in Puckpool Battery.—HENRY BENSON; Jesus College, Cambridge.

VANESSA ANTIOPA AND SPHINX CONVULVULI IN ESSEX.—On September 6th, 1877, I had the good fortune to capture a fair specimen of *Vanessa Antiopa* at Chingford, and saw two others. On the 17th I took a fine specimen of *Sphinx convolvuli* at Whip's Cross.—W. DOWNING; Whip's Cross, Walthamstow, Essex.

ARGYNNIS AGLAIA.—I want to know something about the appearance of this butterfly. Did it occur this season at the usual time? I have generally found it with the smaller fritillaries; but I have searched for it over and over again in its usual haunts, and the first specimen I met with was on August 2nd; then I, with three others, took six specimens between us. On the 4th we took thirty more, and several since. It is still flying, but very much battered about.—V. R. PERKINS; Wotton-under-Edge, August 20th, 1877.

ARGYNNIS ADIPPE.—I had the good fortune to capture a nice variety of *Argynnis Adippe* at Three Bridges, on August 6th. My friend Mr. Wellman drew my attention to one of the finest and most extensive views in the Forest, including Leith Hill, Box Hill, and the Downs stretching through Surrey and Kent. To obtain a more eligible standpoint he led me across an open space in the Forest, and here the *A. Adippe* settled on a flower, its dark markings showing it to be a variety, before I was able to make a closer examination. The under side of the insect is also peculiar.—J. PLATT BARRETT; 34, Radnor Street, Peckham.

PAPILIO MACHAON IN KENT.—In August last I was informed that no less than six larvæ of *Vanessa Antiopa* had been found in the neighbourhood of Greenhithe. Hearing, however, that they were feeding on garden rue, and were of a bright green colour, with orange spots on the back, I need scarcely say that I was incredulous. I went to see them, and,

as I anticipated, saw three larvæ of *Papilio Machaon*, three having already turned to pupæ. It was a curious place for these larvæ—a herbalist's garden on the top of a chalk-hill, far removed from their usual haunts in this country. The three pupæ were the largest I have ever seen, showing that the locality and food-plant were favourable to their development. I may add that, so far as I could learn, they had not been intentionally introduced to the locality.—A. B. FARN; Dartford.

LYCÆNA CORYDON AT HASTINGS.—There being no chalk here, or at all near the neighbourhood, I was surprised at having taken last month (August) a very perfect specimen of *L. Corydon*, a female. It was taken in a small waste slip of land, nearly two miles from the sea. I was also successful in securing in the same place a fine hermaphrodite of *L. Alexis*.—ROSA M. SOTHEY; Sunnyside, Hastings.

[*L. Corydon* is to be seen in Switzerland by hundreds together; as is well known, there is no chalk.—ED.]

COLIAS EDUSA IN LONDON.—During the present week I have seen several specimens of *C. Edusa* in the gardens on the Thames Embankment, near Charing Cross.—A. H. JONES; Shrublands, Eltham, August 17, 1877.

COLIAS EDUSA IN LONDON.—This morning I have seen two beautiful specimens of *C. Edusa*; one in a street leading out of the Tottenham Court Road, and another in the neighbourhood of Russell Square.—H. C. LANG; 41, Berners Street, W., August 18, 1877.

COLIAS EDUSA var. HELICE.—During this August I have obtained, from amongst upwards of twelve hundred *C. Edusa*, fifteen of the variety *Helice*, one very rich cream-colour, with no spots in the margin, which is completely black.—THOMAS EEDLE; 40, Goldsmith's Row, Hackney Road, Aug. 20, 1877.

ACHERONTIA ATROPOS AT WELBECK ABBEY.—A fine specimen of this moth was taken here in the evening of May 29th, while sitting on a wall, apparently at rest. I arrived on the spot a few minutes after it was taken, and identified it, as the fortunate captor of the insect had no idea what it was. While imprisoned in his pocket-handkerchief it several times uttered its plaintive cry.—R. A. ROLFE; Welbeck Abbey Gardens, Worksop, Nottinghamshire.

CHÆROCAMPA CELERIO AT SOUTHSEA.—I have pleasure in

recording the capture of a specimen of *Charocampa Celerio* at Southsea, by a friend of mine, in August last. It flew into a room, in which he secured it; but having commenced collecting very lately he somewhat spoiled it in setting. The specimen is now in my possession.—P. LOWREY; 61, Hackford Road, North Brixton, September 4, 1877.

SPHINX CONVULVULI AT IPSWICH.—A specimen of *Sphinx convulvuli* was brought to me in fair condition, caught here on September 16th.—A. E. A. JACKSON; 22, Anglesea Road, Ipswich, September 18, 1877.

ACRONYCTA ALNI AT DERBY.—On September 1st I had a larva of *Acronycta alni* brought to me, which was found feeding on a pear tree. It continued feeding on pear until September 10th, when it commenced spinning up amongst some leaves.—G. BAKER; Kedleston Street, Derby.

ACRONYCTA ALNI AT WAKEFIELD.—On August 23rd I had the good fortune to capture a larva of *Acronycta alni* in Haw Park, near Wakefield, Yorkshire. This species has not been taken since 1874, when one was found by Mr. H. Sims, of Wakefield.—T. H. TAYLOR; Wakefield.

ACRONYCTA ALNI AT BURTON-ON-TRENT.—I have to-day taken a fine larva of *Acronycta alni*. It was travelling across a walk leading from my house into the town, and shaded by an avenue of horse-chestnut trees. There is a hawthorn hedge, however, not far off.—[Rev.] CHAS. F. THORNEWILL; Burton-on-Trent, August 29, 1877.

ACRONYCTA ALNI NEAR BIRMINGHAM.—I have to record the capture of an apparently full-fed larva of *Acronycta alni*, taken by myself, at Handsworth, on September 5th. Having doubts about getting an imago, as I could not get it to feed, I gave it some soft turf, in which it has since spun, and is now a pupa.—C. H. PERRINS; Westminster Road, Birmingham, September 12, 1877.

ACRONYCTA ALNI IN HEREFORDSHIRE.—I found a larva of *Acronycta alni* at Pontrilas, Herefordshire, August 16th, on an apple tree. It is now looking healthy, and feeding upon alder and hawthorn.—W. EDWARDS; Malvern.

EMMELESIA UNIFASCIATA NEAR CAMBRIDGE.—I captured two fine specimens of *Emmelesia unifasciata* here this evening at light. Curiously enough I captured two on the same evening last year. I believe this species has not before

been taken in the county.—A. THURNALL; Whittlesford, near Cambridge, August 10, 1877.

LEUCANIA ALBIPUNCTA AT DEAL.—I took two specimens of this rare British *Noctua* at sugar in the above locality, on the night of August 26th.—R. MELDOLA.

XYLOMIGES CONSPICILLARIS AT MALVERN.—I was fortunate in breeding six fine specimens of this rare *Noctua*, from pupæ dug at elm trees, last autumn. The first emerged March 12th; the sixth, April 19th.—W. EDWARDS; Malvern.

XYLOMIGES CONSPICILLARIS.—A fine specimen of *X. conspicillaris* was taken off a fence near Brentwood, Essex, on Whit Monday, May 21st, by Mr. Richards, of Bow.—D. PRATT; Hon. Sec., East London Entomological Society.

CANTHARIS VESICATORIA.—On the 2nd of July I had a live specimen of *C. vesicatoria* given to me, which was found in a garden at Norwich.—R. LADDIMAN; Upper Hellesdon, Norwich.

ABUNDANCE OF SCOPARIA CEMBRALIS.—During the past month *S. cembralis* has been most abundant in two small fields adjoining my garden and house. One of the fields is full of weeds and wild plants, and in it *S. cembralis* last night abounded. At dusk, when they began to fly, the sky was very cloudy and the atmosphere close; consequently the moths flew slowly, close to the ground, and were constantly settling on the grass and weeds. It is no exaggeration to say there were hundreds, probably thousands; and large numbers might have been netted in a few minutes. *Crambus cullmellus* and *C. tristellus* were flying with them. It may be worth noting, too, that I have taken a few of Dr F. Buchanan White's variety *Scotica* amongst them.—GEO. T. PORRITT; Highroyd House, Huddersfield, August 18, 1877.

RARE LEPIDOPTERA ON THE SOUTH COAST.—I have had a very successful excursion during the past month of August on the south-east coast of Kent. I took personally the following rare or interesting species, viz.—two *Mecyna polygonalis*, two *Margarodes unionalis*, one *Sterrhia saccharia*, one *Laphygma exigua* (also doubtful second example), one *Leucania albipuncta*, two *Heliothis peltigera*, one *H. armigera* (female, I got a few eggs from this specimen), *Lithosia pygmæola*, *Spilodes sticticalis*, and *S. palealis*. *Colias Edusa* swarmed to a degree I never before witnessed; the variety

Helice was not uncommon; but curiously I did not see *Colias Hyale*, nor could I learn that any had been observed on that coast. The larva of *Acherontia Atropos* was common in the district. I think I did moderately well, but I worked hard.—W. H. TUGWELL; 3, Lewisham Road, Greenwich, September 6, 1877.

CAPTURES IN NORTH WALES.—I have been endeavouring, whilst in North Wales, to discover the larva of *Ennychia octomaculalis*, but have signally failed. Capturing some forty or fifty imagos, males and females, I placed them together in a box for the purpose of breeding, but not a solitary couple could I find *in cop.* They all died without ovipositing. After seven o'clock p.m., at Rhyl, and in almost exactly one spot, I captured eighteen specimens of *Pyrameis cardui*, their battered condition indicating hibernation. At Llanrwst, *Abraxas ulmata* swarmed; and in the pretty vale of Ffestiniog I could have netted hundreds of *Argynnis Selene*, *Hesperia sylvanus*, and *Thecla rubi*; *Thanaos tages* was very common; and I also took *Vanessa polychloros*, *Venusia cambricaria*, *Macroglossa stellatarum*, *Venilia maculata*, *Selenia illunaria*, &c.—S. D. BAIRSTOW; Woodland Mount, Huddersfield, July 9, 1877.

CAPTURES NEAR GATESHEAD.—During the season of 1876 I captured:—May 21st, one *Selenia lunaria*, two *Cidaria silacea*, at Thornley Dean; July 15th, a black variety of *Xylophasia polyodon*, a fine *Geometra papilionaria*, and a female *Pericallia syringaria*. I also bred a fine specimen of *Cymatophora ridens*, from a larva taken at Gibside. The latter two species are, I believe, hitherto unrecorded from this county (Durham).—THOS. H. HEDWORTH; Dunston, Gateshead-on-Tyne.

CAPTURES AT WITHERSLACK.—My friend Mr. Threlfall and I had a day and a half collecting recently at Witherslack. Although the weather was rough and stormy, I took in sheltered corners *Coleophora Wilkinsoni*, *C. limosipennella*, *C. therinella*, *Plutella annulatella*, *Coleophora pyrrhulipennella*, *C. Fabriciella*, *C. alcyonipennella*, *Parasia neuropterella*, *Catoptria expollidana*, *C. scopoliana*, *Eupithecia lariciata*, *E. constrictata*, *Macaria alternata*; larvae of *Depressaria capreolella* and *carduella*; *Phoropteryx siculana*, *P. biarcuana*, *Lithosia mesomella*, *Dicrorampha*

consortana, *D. acuminatana*, *D. herbosana*, *Gelechia dodecella*, *G. senectella*, *Pterophorus tetradactylus*, *P. Bertramii*, *P. plagiodactylus*; and many other species. On arrival home I found a hundred or more moths out, including quite twenty *Rodophæa marmorella*, and best of all the *Cidaria reticulata*, already recorded.—J. B. HODGKINSON; 15, Spring Bank, Preston, July 11, 1877.

CAPTURES AT SHERWOOD FOREST.—Mr. George Dennis and I spent a week in Sherwood Forest this autumn, where we took a number of *Euperia fulvago*, but they were rather worn in most instances. *Crambus pinetellus*, *C. inquinatellus* and *Scoparia truncicolalis*, were numerous and fine. Mr. Dennis took two *Sesia cynipiformis*, which were apparently just out of pupæ. Amongst a number of other larvæ I took specimens of *Acronycta alni* and *Stauropus fagi*, both of which were nearly full fed. Larvæ generally were scarce, and the weather was wet. This was not up to the average of a season at Sherwood.—C. W. SIMMONS; 16, Blossom Street, York.

ON THE REARING CIDARIA IMMANATA.—No one need be surprised at the deep interest taken by the late Mr. Henry Doubleday in rearing this species from the egg on account of its beauty and great variation. It is met with rather freely in some of the woods here; so during last August (1876) I collected all the female specimens I could to obtain a goodly supply of eggs. I adopted the method advised by the late Mr. Doubleday, of placing a strawberry plant in a large flower-pot saucer, and covering it with a framework of gauze to the height of nine inches, so as to form a kind of breeding-cage. I placed therein the leaves on which the eggs were deposited, leaving the cage in the garden during the winter, exposed to all kinds of weather. Mr. Doubleday always maintained that if the eggs were kept in-doors they invariably dried up. This I cannot confirm, but hope to do so next winter. Towards the end of March and beginning of April the eggs began to hatch: I then collected the young larvæ and fed them in-doors. It is a very rapid feeder, for in the space of three or four weeks many attained the pupa state; and on the 28th of May the moths began to appear. I believe it is generally known that there is but one brood of *Cidaria immanata*, which appears towards the end of July

and in August; whereas its allied species, *Cidaria russata*, is out in May and again in July, lasting with a succession of broods until December; while *Cidaria immanata* seldom lasts more than a month from its first appearance. Many collectors even now confound the two species; but if they would take the trouble to rear the two from eggs they would soon see the distinction, and be amply rewarded.—F. O. STANDISH; Cheltenham, June 16, 1877.

CURIOUS FOOD-PLANT OF NYSSIA ZONARIA.—I have succeeded this year in rearing, as far as the pupa state, a brood of *N. zonaria*, hatched from eggs sent to me by a correspondent at Birkenhead. They have been fed regularly on the common yarrow (*Achillea millefolium*); but during my absence from home in June, a young friend, whose botanical knowledge is somewhat limited, treated them to a dose of the garden plant known as "old man" or "southernwood," a species of *Artemisia*, and, strange to say, they ate it as readily as their proper food. Perhaps it may be discovered that such an event is not wholly without parallel in a state of nature. I should say that I tried my larvæ at first with sallow, but they would not eat it all, while they took to the yarrow at once.—[Rev.] C. F. THORNEWILL; Burton-on-Trent, August 1, 1877.

PARASITES ON LARVA OF BOMBYX RUBI.—About a fortnight since I picked up on the hill-side a half-grown caterpillar of *Bombyx rubi* (the fox moth), which is abundant in this neighbourhood, but this particular one attracted my attention, inasmuch as it had several pale brownish cocoons of a species of ichneumon attached to the hairs of its back and sides, not in a cluster, but each separate, and standing at right angles to the body. The larva did not seem any the worse for these parasites; and I question very much whether they properly belonged to it. I have this morning, August 21st, hatched three or four of the flies, and should like to know what they are—probably a *Microgaster*?—V. R. PERKINS; Wotton-under-Edge.

PRESERVATION OF LARVÆ BY INFLATION.—The exhaustive paper on this subject in the September number of the 'Entomologist' (Entom. x. 223) leaves little to be added; and my only object in writing is to say that those who do not care to be at the trouble of making the "pressure-bottle," so

well described, will find an excellent substitute, and probably a much handier instrument, in one of "Clarke's spray producers." This is what I always use, and it was first suggested to me by Lord Walsingham, who had used it for some time previously. It is an instrument used by medical men and others, and is the same in principle as the "pressure-bottle," being simply an india-rubber tube, having two balls, one at the end, in which is a valve, which on being squeezed with the hand distends the other ball about the middle of the tube, and keeps up a constant current of air, strong or weak, according to the rapidity of the pressure on the end ball. It is very simple, and thoroughly efficient; and may be obtained of any druggist, or dealer in surgical instruments, for five or six shillings.—GEO. T. PORRITT; Highroyd House, Huddersfield, September 7, 1877.

NOTES ON PUPA-DIGGING.—Not many readers of the 'Entomologist' perhaps are systematic pupa-diggers. A collector may begin to dig for pupæ with sanguine hopes of success, soon, however, to be dispelled by a few hard clods and empty pupa-cases; still those who persevere in digging can scarcely fail, sooner or later, of some measure of success. Mr. H. Benson and I have found digging by no means a failure. Last year we dug up two pupæ of *Cymatophora ocularis*, both of which reached the imago state; pupæ of *Notodonta dictæa*, *Scopelosoma satellitia*, *Amphydasis betularia*, about twenty *Pygæra bucephala*, and sixty *Tæniocampa instabilis*; also a few *T. stabilis*, *T. cruda*, *T. gothica*, *Nyssia hispidaria*, and *Hybernina progemma*; we found about twelve pupæ of *Mamestra brassicæ*, one *Arctia mendica*, twenty *Smerinthus populi*, thirty *S. tiliæ*, and about two hundred *Sesia apiformis*. Off trees we took two pupæ of *Dicranura vinula*, and from under the bark of trees two pupæ of *D. bifida*, one of which became an imago, and a considerable number of *Acronycta megacephala*. In the roots of willows we found some pupæ of *Sesia bembeciiformis*, of which six turned into perfect insects. We have found a small trowel to be on the whole the best implement to use, a pupa-digger having the disadvantage of maiming most of the pupæ it happens to touch, though it is most useful in pulling away the grass round trees. A bark-ripper is objectionable on the ground of the havoc it makes with trees; yet it can be

used to advantage for breaking off small pieces of bark.—A. E. HUNTER and H. BENSON; Jesus College, Cambridge, August 25, 1877.

NAPHTHALINE FOR KILLING MITES.—In common, I expect, with many other of the readers of the 'Entomologist' for April (Entom. x. 104), I was delighted to see that naphthaline was so sure and speedy a mite destroyer. . . . I lately purchasing a bottle, I placed some of the unpleasant-smelling crystals in my collection; and at the same time, to test its efficacy, half filled a pill-box with it, and imprisoning two small beetles, a fly, and a caterpillar in the box, left them to their fate. An hour afterwards they were as lively as ever, next day they were still more lively, and the day after the beetles ate the caterpillar. Why was not the naphthaline fatal to them?—E. K. ROBINSON.

CENTIPEDE DEVOURING A MOTH.—While sugaring near Taunton, on the evening of September 15th, I rescued a specimen of *Agrotis saucia* from the clutches of a centipede, which had surprised and was greedily devouring it. It was only with some difficulty that I persuaded the destroyer to let go his victim.—[Rev.] C. F. THORNEWILL; The Soho, Burton-on-Trent.

ENTOMOLOGICAL SOCIETY OF LONDON.

August 1st, 1877.—J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Mr. Stevens exhibited specimens of *Teretrius picipes* (Fab.), one of the *Histeridæ*, which he had taken on the same fence, at Norwood, on which he had previously taken *Tillus unifasciatus*. He also remarked on the appearance in his neighbourhood of a second brood of *Colias Eduza*, several specimens having been observed by him, all of which were males.

Mr. Smith exhibited, on behalf of Dr. Bennett, of Sydney, who was present at the meeting, a fine pair of the beautiful and rare beetle *Eupholus Bennettii* (Gestro), from Yule Island, New Guinea. It had been described under that name in the 'Annali di Museo Civico di Genova,' viii., 1876.

The Secretary exhibited a specimen of an insect which had been forwarded to him by Mr. Bewicke Blackburn, who

stated that a large field of mangolds belonging to the Knight of Kerry, in the Island of Valentia, had been totally destroyed by it. The specimen was examined by several of the members, who agreed that it was the larva of a coleopterous insect, but in consequence of its imperfect condition it could not be determined.

Mr. Douglas, who was unable to be present at the meeting, had forwarded to Mr. Jenner Weir a letter he had received from Mr. R. A. Ogilvie, enclosing specimens of an insect found in great quantities in a jar of pickles (piccalilly). They confined their attacks to the pieces of cauliflower in the jar, which they appeared to relish, notwithstanding the vinegar, mustard, pepper, &c., in the pickles. The specimens had been submitted to Professor Westwood, who replied that "the flies were the common *Drosophila cellaris*, with their curious two-horned pupæ; and they frequent cellars and cupboards, delighting in stale beer, wine, &c." He supposed that "the cauliflowers were more to their taste than the other things in the jar, being more succulent and flabby." In answer to a question put by Mr. Ogilvie, he said that the eggs were laid in the pickle-jar, and not in the vegetables before they were pickled.

Mr. Douglas also forwarded a letter he had received from Mr. A. H. Swinton, of Guildford, enclosing a specimen of *Myrmica ruginodis*, which, on being placed under a wine-glass, stationed itself at the rim, head downwards, and rapidly vibrating the abdomen, continued "an intense noise," resembling the spiracular piping of the Dipteron, *Syritta pipiens*.

Mr. Enock remarked, with reference to a spider which had been exhibited by Sir Sidney Saunders at a previous meeting as *Atypus Sulzeri*, that he had taken the specimen himself at Hampstead, and that he had since referred it to the Rev. O. Pickard-Cambridge, who stated that the insect was certainly not *A. Sulzeri*, but that he considered it to be *A. Beckii* (Cambridge), which would probably be found to be the same as *A. piceus* (Thorell), though he was not certain, as the only female which he had of that species was too much damaged to admit of any satisfactory comparison. The type of *A. Beckii* was an adult male given to him by the late Richard Beck, who was uncertain of the locality, though Mr. Cambridge

appeared to think it probable that he had got it from Hampstead, as he often collected there. The example sent to him by Mr. Enock was different from the Isle of Wight species, of which he had several female specimens, but no males, though he believed them to be *A. Sulzeri*. He would be very glad if collectors in the Hampstead locality would look out for the males in the autumn and winter, as if he could obtain that sex it would enable him to put the question, as to species, at rest.

Mr. Enock exhibited a bottle containing a great number of larvæ of *Cossus ligniperda*, which he had found in a portion of a small willow. He had taken sixty-six larvæ out of a piece of wood four feet long.

Mr. Dunning again directed the attention of members to the exhibition by Mr. J. Jenner Weir, at the last meeting, of a female specimen of *Cicada montana*, which was reported to have been distinctly heard to stridulate, notwithstanding that the insect was a female, and also that the species was one of which even the males were not previously known to stridulate. Mr. Weir stated that since the last meeting he had again been to the New Forest, and had seen, in the possession of Mr. James Gulliver, of Ramnor, near Brockenhurst, two specimens of *Cicada montana*, and he was assured by Mr. Gulliver that the stridulation of the insect was well known to him, and that he was guided by the sound so made in effecting the capture. Mr. Champion said that he himself had captured the insect, and had distinctly heard a loud noise, but whether the sound was caused by the males or females he could not say. Mr. Dunning considered that further evidence was wanting to prove stridulation in the females.

REVIEWS.

Manuscript Notes from my Journal; or, Illustrations of Insects, Native and Foreign. Order—Hemiptera. Suborder—Heteroptera, or Plant-bugs. By TOWNSEND GLOVER, Washington, D.C., 1876; pp. 132; 4to.

IN many respects this is rather a singular work. Mr. Glover seems endowed with an unusual talent for collecting and arranging notes upon the various orders of insects, and desirous of making useful to others the result of his labours,

and yet at the same time unwilling to go to the cost of printing his notes, he has adopted the plan of transcribing them on lithographic paper, illustrating them with original etchings on copper, hand-colouring the same, and issuing a limited edition of fifty or sixty copies, which he distributes to such societies, &c., as are likely to make most use of them. All this the author accomplishes in his leisure hours; and, whatever value his labours may have, we cannot but admire his industry.

In the absence of any synopsis of the North American *Heteroptera*, we can well imagine the work before us proving of considerable utility to the young student. Space will not permit us to allude at any great length to the contents of the book; but we may mention that amongst others it contains notices of the various classifications that have been adopted; lists of the predaceous, parasitic and injurious species; of the insects that destroy *Hemiptera*; of the various remedies against injurious species; notes of the habits and food; &c.

In the present notoriety of the Colorado potato-beetle, it may be of interest to note that in America the following species of *Heteroptera* are said to destroy it:—*Podisus cynicus*, *P. spinosus*, *Milgas cinctus*, *Perillus circumcinctus*, *Sinea multispinosa*, *Stiretrus fimbriatus*, and, probably in the egg-state, *Lygus lineolaris*. It is not unlikely, then, that in the very improbable circumstance of its becoming established in this country, some of our native *Hemiptera* may attack it.

The work is illustrated by ten plates, etched and coloured by the author. The figures (whose colour is perhaps a trifle feeble) will prove of great service in carrying out the purpose of the book.—F. B. W.

The Colorado Potato-Beetle. Illustrated and described by
Dr. ANDREW WILSON. W. & A. K. Johnston: Edinburgh and London, 1877.

WE cannot speak too highly of this pamphlet, whether with regard to the beautiful coloured plates illustrating the life-history of *Doryphora decemlineata*, including some of its fatal parasites, or of the pleasant but instructive way in which Dr. Wilson tells us all about this insect from its first discovery in 1824, and the record in the third volume of the Proceedings of the Academy of Natural Sciences of Philadelphia, down to

the present time, when its name has become a terror to the American potato-growers. Following this historical sketch, Dr. Wilson popularly defines what a beetle is, and then shows the place of the Colorado amongst beetles. In the same popular manner the author goes on to describe the habits and various stages of the insect, and compares it with the "Bogus potato-bug," which is figured for comparison. Lastly, he treats his subject from an economical point of view, and describes the damage done by this insect, and the remedies which have been successful or otherwise. As we finish reading this little work we cannot help wishing there were more to follow, and that the author had extended his labours a little further, for the reader's interest is kept up to the last. We would especially recommend our agricultural readers who are interested in the subject to purchase the pamphlet.

DEATH OF WILLIAM ARNOLD LEWIS.—We regret to have to record the death of Mr. W. Arnold Lewis, who with his companion Mr. Noel Paterson and three guides lost their lives in the fatal accident on the Lyskamm, on September 6th. Mr. Lewis was educated at Harrow; and after practising for a short time as a special pleader was called to the bar in 1869. Such time as he could spare from his professional engagements he devoted to Entomology, in the study and pursuit of which he displayed a zeal and energy which sometimes led him into conflict with those whose tenets clashed with his. The *Lepidoptera* were his favourite group; and he chiefly distinguished himself by his opposition to the constant alterations in the nomenclature of the order. His papers on that subject, read before the Entomological Society and the British Association, showed a fund of knowledge and a power of reasoning and vigorous expression, which, if they failed to convince, commanded the admiration of all his opponents. Mr. Lewis was elected a member of the Entomological Society in 1869, and a fellow of the Linnean Society in 1872. His remains lie buried at Zermatt. All who knew him well, and especially those who ever joined him in his entomological excursions, will deplore the sad catastrophe which terminated his life at the early age of thirty.

THE
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VOLUME THE ELEVENTH.

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—
1878.

" Happy is he who lives to understand,
Not human nature only, but explores
All natures,—to the end that he may find
The law that governs each ; and where begins
The union, the partition where, that makes
Kind and degree, among all visible Beings ;
The constitutions, powers and faculties,
Which they inherit—cannot step beyond—
And cannot fall beneath ; that do assign
To every class its station and its office,
Through all the mighty commonwealth of things ;
Up from the creeping plant to sovereign Man.
Such converse, if directed by a meek,
Sincere, and humble spirit, teaches love ;
For knowledge is delight ; and such delight
Breeds love : yet, suited as it rather is
To thought and to the climbing intellect,
It teaches less to love, than to adore ;
If that be not indeed the highest love ! "

WORDSWORTH.

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VARIETY OF *ARGE GALATHEA*.

By J. PLATT BARRETT.



ARGE GALATHEA (VARIETY).

THIS variety was captured by myself on the 23rd of July, 1875, in the immediate vicinity of Gravesend, Kent. The variation consists of a diminution of the central black markings, and of the white markings in the hind margins. The large black blotch extending from the costa to the middle of the fore wings, and a blotch of similar character in the hind wings, are entirely absent, while the usual white spots in the hind margins have almost disappeared. This gives to the specimen the appearance of having a black border; but the peculiarity was not very striking until the insect was set out.

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ON THE HABITS OF EAST INDIAN INSECTS, ESPECIALLY LEPIDOPTERA.

By M. C. PAPERS. Translated from the Proceedings of the Dutch
Entomological Society, vol. xix., by

W. F. KIRBY.*

WHEN I collected our indigenous butterflies in the neighbourhood of Arnhem, many years ago, I observed that several of the largest and finest species frequented the neighbourhood of clear running water. I considered the brooks on the estate of Mariendaal a good hunting-ground, for I had already found so many fine specimens there that I always directed my steps thither again, sure that sooner or later I should again make some good capture.

When, ten years later, I again took up the butterfly-net in the East Indian Islands, the same thing happened to me there also; only, as one who is accustomed to tropical climates would expect to find, on a much larger scale than in temperate regions. In these islands—where the clear mountain streams rush foaming over masses of rock, especially where the rivers flow swiftest and purest, down waterfalls, or near water broken by irregularities of the bed—the haunts of the great butterflies are to be found, and there can one feel sure, when there is no want of sunshine, of seeing himself surrounded by many forms of these children of the sun, whose number and beautiful colours would amaze the Northern collector. I say amaze; but his eye and mind would alike be ravished with the possession of the beauties of Nature, for nowhere does tropical nature show itself more dazzling than here, where in the twilight formed by the over-arching of the incredibly luxuriant tropical vegetation, due to the heat and damp, the mountain stream, in the fierce glare of the sun, rushes swiftly down like a broad, shining silver streak, breaking through the darker hues of the bank, foaming and dashing spray over every rock in its path, which is covered at every turn with drops of water, illumined by the sun into glittering jewels: while above and between, in perfect harmony with that life,

* A GERMAN translation, by Dohrn, of the greater portion of this paper, has been published in the 'Siedtiner Entomologische Zeitung'; and I have sometimes checked my own translation by it.—W. F. K.

splendour, and beauty of colour, the richly ornamented flying flowers, which we call butterflies, flit to and fro.

Why do we find butterflies prefer such places? It is perhaps because they are, if I may so express it, of a thirsty nature—and this although they prefer the very hottest sunshine, and even seem to find it so necessary, that if the sun is only clouded over for a minute they settle as soon as possible; and if the sun should not shine—in the case of some individuals even if it should not be shining very strongly—never leave their hiding-place the whole day. I have seen some striking examples of this, one of which has, I think, never been recorded, and seems at first sight altogether to conflict with the idea that one is accustomed to form of the habits of butterflies. Even in the Netherlands we may occasionally see butterflies alight on damp sand, on which the sun is shining, to suck up moisture from the ground; but if, in the East Indian Islands, we walk along the sandy or gravelly bank of a mountain stream, or along the bed of a nearly dry stream composed of similar materials, during the hottest part of the day, we shall disturb butterflies at almost every step, especially *Papilionidæ* and *Pieridæ*, which sit there on the damp ground to refresh themselves with visible pleasure, but with wings closed so that they are scarcely discernible; and you suddenly see swarms of such butterflies fluttering up into the air from before your feet. I was once travelling in South-west Celebes, when my companion suddenly exclaimed as we were crossing a nearly dry brook, "Oh, look what a beautiful flower!" And on looking where he pointed I saw in the bed of the stream amongst the damp gravel a beautiful orange-coloured flower with a white centre, about ten centimetres in diameter. The strangeness of the occurrence led me to step nearer in order to observe it more closely, when what did I see?—the flower consisted of two concentric rings of butterflies (*Callidryas Scylla*, Linn.), which had closed their wings (which are yellow, and orange beneath), and were busily sucking up the moisture from the damp sand, and thus represented in the most closely deceptive manner the petals of a flower. They surrounded five of another white species of *Pieris* similarly occupied, which thus seemed to form the white centre of the flower. I still remember the amazement

of my travelling companion, when on my nearer approach the whole flower dissolved into a swarm of butterflies.

I afterwards saw another beautiful flower of the same kind, in which the petals were composed of a number of the red *Pieris Zarinda*, along with some yellow and white *Pieridæ*, in another part of South-west Celebes, in one of the above-mentioned places, where butterflies, especially *Papilionidæ* and *Pieridæ*, love to resort, just above the beautiful waterfall of Maros, which Wallace has described; and I saw there at the same time something which I never saw before or afterwards, and had never heard or read of before,—for there I saw a butterfly bathing.

While I stood on the bank of the river, which forms at this spot an apparently still and very clear pool before entering the cleft in the rock, from which it reappears as a foaming and thundering waterfall, a specimen of *Papilio Helenus*, Linn., came flying over the water. Flying low, as is the habit of this species, it came within a short distance of me, when I saw it suddenly half-close its wings and dive down close beside me, so that the whole body and about a third of the wings, which slanted upwards, were immersed; it then raised itself again out of the water and flew away. We cannot require stronger proof of the necessity of moisture to an insect which seems so little fitted for contact with water.

Just as some plants in the East Indies choose the driest localities parched up by the burning sun, so do some butterflies select similar spots,—such, for instance, as *Junonia Orithya*, Linn.,—and without needing rest enjoy settling on the scorching hot sand. And like other plants which choose very damp and deeply shaded localities in the forest, where no ray of sunlight can penetrate, some *Satyridæ* and other butterflies, usually of dark colours, love to haunt these dark and dripping nooks. Again, as the most beautiful and vigorous tropical vegetation is developed where the fiery heat of the sun is coupled with great dampness, so do the largest and most brilliant butterflies delight to frequent such places, where they rejoice in the sunshine, and have also the dampness which they so much need. It is worth mentioning that among these last butterflies this is not due, as in other insects, to the peculiarity of their habits and surroundings, but the explanation is to be found either in

the food of the perfect insect or in its care for its offspring. So that it seems as if the nature of the larvæ which live on plants growing in warm and damp places, and on which the peculiarity of the nourishment does not seem to be without influence, also remains with the perfect insect, although it is no longer useful to it.

At the same waterfall of Maros I witnessed another proceeding among butterflies, which I think worth mentioning. It is known that male butterflies, like most other animals, fight with each other from jealousy; but in other respects these insects are to be considered, as far as I know, very peaceable, and by no means quarrelsome creatures. I was, therefore, much astonished to observe the following incident:—Around and over the blossoms of a flowering shrub flew several butterflies (*Precis Iphita*, Linn., and some *Pieridæ*), when a butterfly of gigantic size, in comparison with them, *Papilio Remus*, Cram., came flying, apparently with the object of sharing their repast. Whether the others were desirous of the company of a guest among them whose appetite would be enormous, or not, it is certain that I saw them attack the *P. Remus*, drive it away, and pursue it for a short distance, till it was evident that it had really taken to flight, when they returned to their flowers. I have often seen swallows and other small birds drive away and pursue birds of prey which showed themselves in the neighbourhood of their nests, in a precisely similar manner: they fly above the great enemy, and suddenly drop down upon him, or peck him, till he tires of the rapid and repeated attacks (against which his size and consequent lesser rapidity of flight hinder him from defending himself), and is forced to seek safety in flight, when his little enemies do not neglect to pursue him for a short distance. This reminds me that I have also read of similar attacks of humming-birds upon American Sphinges, arising from jealousy about their food; but in the present instance the assailants and victors were not birds provided with sharp-pointed beaks, but apparently defenceless butterflies.

Is it, then, perhaps, throughout the insect world, "everyone for himself;" and are so many of the lovely, winged, beautifully-clothed creatures, apparently so mild and defenceless, really vicious? It cannot be denied

that this very rational behaviour leads us to think that butterflies have more understanding than is generally supposed. I think the following incident will show that they are not deficient in memory:—One evening I saw, in the open verandah of the Harmonic Society, at Manghasar, a specimen of a butterfly which is very common there, *Precis Iphita*, Linn. Notwithstanding the very strong illumination, this little creature remained sitting quietly in the same place on the ceiling during the whole evening. When I came to the Society next day I did not see it; but in the evening it was again sitting quietly in the same place. And as civilisation has not advanced so far in Manghasar that it is there considered necessary mercilessly to destroy or drive away every harmless creature which ventures into or near a human dwelling, I had the pleasure of admiring the memory of this *P. Iphita* for six days. It was not to be found in the daytime, and was then probably absent on business; but every evening, for six consecutive evenings, I found it return faithfully to the same sleeping-place. Then some accident probably befel it, for I never saw any trace of it again.

I do not know whether all butterflies return to the same sleeping-place so regularly; but I have the following observations to record on the sleeping-places of the *Lycanidæ* and of the *Micro-Lepidoptera*. When you go into an Indian forest at daybreak, while the grass and low-growing plants are still quite wet with the night's dew, you see *Micro-Lepidoptera* sitting everywhere on the tops of the plants. As soon as the rays of the sun begin to make themselves felt, which quickly happens, and dry up the plants, the little animals creep slowly down the stalks, and hide themselves in the moss and among the roots of the plants to pass their day's sleep in stillness and darkness. An hour after sunrise there is not a trace of them to be seen. The *Lycanidæ*, however, which are day-flyers, do just the opposite at this time. As soon as the sun begins to make itself well felt they creep slowly up along the stalks of the low plants; and when they have basked for a long time on the top in the warm sunlight they fly away. The influence of the warmth of the sun on the flight of butterflies may also be noticed from the circumstance that in the Netherlands very few butterflies are seen on the wing before eight o'clock in the morning, even during the

longest summer days, and those which love great heat—such for instance as the *Lycænide*—do not appear in daylight till some time later; whereas in the East Indies the butterfly world is already in full movement by a good hour after sunrise.

When Linnæus made his classification of animals, he established among *Lepidoptera* a class of twilight-flyers, or *Crepuscularia*. Independently of the fact that other and better principles of classification have subsequently been employed, it was soon observed that the so-called twilight-flyers are really true night-moths, which fly during the whole night, and not at morning and evening twilight only. But in the East Indies we meet with true twilight-flyers, which do not belong to the genus *Sphinx*, which Linnæus considered such, but to the great group of *Rhopalocera*. The sun has scarcely set before we see everywhere, both in Java and Celebes, numbers of the common *Cyllo Leda*, *Amathusia Phidippus*, and *Casyopa Thrax*, Linn., and in Celebes, *Debis Europa*, Fabr., also, but I never saw these species wandering about at night in the moonlight, or entering lighted rooms, like the true night-moths, which are very numerous, although like the latter they sit still and repose all day, and if disturbed only fly a little way, and settle again directly. I have also seen the commonest of these butterflies, *Cyllo Leda*, flying in abundance in the morning twilight; and I once observed the same with *Debis Europa*. Moreover, I suspect from the exactly similar behaviour of different species of *Mycalesis*, and of *Elymnias Laïs*, Cram., in the daytime, that these should also be included among the twilight-flyers in Java.

In every country with which I am acquainted it is well known that many *Lepidoptera* are very injurious in the larva state, but the perfect insect is considered everywhere to be harmless. I must tell the truth about this, as I have already about their gentleness, and attack their reputation on this point also. In South-west Celebes a small white moth, an undescribed species of *Scirpophaga*, is one of the pests of the country. These moths fly into lighted rooms in the evening in incredible swarms, settle upon everything, including the inmates; and where they touch the naked skin they leave an intolerable itching behind. Besides, they dirty the white walls of the rooms everywhere, by firmly attaching to them quantities of eggs covered with yellow down.

I now turn to caterpillars. I have often been surprised that in the East Indies, where there is so great a variety of butterflies, so few caterpillars should be met with. My observations lead me to think that this is to be ascribed to the circumstance that probably a large portion of the Indian larvæ, as is the case with some in the temperate zones, avoid the light and heat of the day in the ground, and only visit the plants on which they feed at night; besides, as is also the case with tropical as compared with temperate plants, very few seem to be gregarious; at least I never found a great number of larvæ together, except those of *Bombyx Waringi*, Teysm., a quantity of whose larvæ I once met with on a young *Ficus Benjaminea*, Linn.

Among the larvæ which I had an opportunity of observing I noticed the important fact, long known in Europe, that some species seem to desert the plants on which their species originally fed for imported plants; just as in the Netherlands the larvæ of *Acherontia Atropos*, Linn., now seems to live by preference on the potato plant, which was introduced from America, and cannot be excluded from it, so we find the very common larva of the equally common butterfly, *Papilio Agamemnon*, Linn., both in Batavia and South-west Celebes, always feeding on the leaves of *Anona muricata*, Linn., a plant introduced from the West Indies. I also met with the larvæ of *Euplœa Midamus*, Linn., feeding both on an indigenous plant and on the oleander, which was imported from Europe as an ornamental plant; and at Manghasar the larvæ of *Cylo Leda*, Linn., were not uncommon on the South American pampas-grass, which I grew in my garden for horse-fodder.

Among East Indian larvæ I also observed the peculiar variations and resemblances, perhaps partly explicable by mimicry, but always remarkable, which occur among larvæ themselves, so that some, apparently without any rule, which produce allied butterflies, are very similar, while at other times those of species which resemble each other very closely (such as the European *Acronycta tridens* and *A. psi*), always exhibit a great difference in their larvæ; and, again, other species, which are very distantly related, are produced from larvæ with the closest mutual resemblance. The larvæ of the closely allied *Papilio Memnon* and *P. Polytes*, Linn., differ

only in size and in their food-plant. The little arrow-head-shaped larva of *Bombyx Waringi*, Teysm., which we have just mentioned, is exactly like a diminutive *Sphinx* larva; the larvæ of the widely separated *Amathusia Phidippus*, Linn., and *Lasiocampa Vishnon*, Guér., though of very peculiar form, differ only in colour and food. Among the larvæ of *L. Vishnon* I once saw something which never occurred to me at any other time: on the whole length of the back some specimens (for this larva varies extremely in colour and markings) showed a beautiful mark, which appeared like a stripe embroidered with white and yellow floss-silk, while there was an abundance of white and yellow hairs along both sides of the larva. Shortly before they changed into pupæ the white and yellow colour, both of the stripe and of the long hair at the sides, changed to violet, without this being due to moulting.

The hairs of the larva of *Miresa nitens*, Walk., figured by Horsfield as *Setora nitens*, presented a still stranger appearance. When I met with this very beautiful larva it was completely covered with so-called spines: I counted eight large and twenty-four small. After a few days it moulted, without seeming to undergo any alteration in its external appearance. A few days later it moulted again; and now I saw the spines changed into tufts of hairs, some of which resembled stiff bristles, and others were more like pencils of hairs. Three days later the hairs of these bristles united again, so that they seemed to form stiff bristles as before the moulting; but three days later the hairs again divided, and the previous shape of bristles and pencils came back. After this the spiny shape did not return, but the same tufts of hairs altered their shape daily, so that one day they resembled bristles, and another pencils. And this continued till the larva became a pupa.

During my residence in the East Indies I busied myself chiefly with *Lepidoptera*, and I cannot therefore say much about insects of other orders. But I cannot refrain from observing, though it is nothing new, how much stronger and more conspicuous insect life appears in the tropics than in temperate climates. The annoying pertinacity of the flies—which always return, however often driven away—is known to every inhabitant of the East Indies; and every

housekeeper knows that no place of security is inaccessible to the innumerable ants. My watch stopped one night; and when I took it to the watch-maker he took a small ant from among the wheels, which had availed itself of the narrow opening left for the spring to work in, to squeeze itself into the watch and taste the fine oil with which the works were lubricated. Almost every evening hundreds of small insects of all orders find their death in every lamp; innumerable *Coleoptera* fly into lighted dwellings, whose nearest relations in the temperate zone also possess wings, but very rarely use them; as well as a harmless but very troublesome *Gryllotalpa*, much dreaded by ladies, which resembles *Sphinx convolvuli* in its reckless flight. Who has not been disturbed at supper-time in the East Indies by swarms of termites suddenly flying in and out? or, still worse, by ill-smelling *Orthoptera*? or the intolerable itching caused by the species of *Lepidoptera* mentioned above? Who has not been compelled, by the ravages of termites or cockroaches in linen chest or library, to utter the socialistic wish that he had no private property? And above all, among those who cannot always remain in the better arranged dwellings of large towns, who does not remember those never-to-be-forgotten Indian nights, in which poets and lovers might have revelled, but when wearied men who wanted sleep were plagued by blood-sucking mosquitoes, crawling ants and other insects, as if by actual demon tormentors?

Let me relate a single night's experience, which may serve as a small contribution to the still unknown life-history of an Indian insect:—One night I was asleep at Batavia, thinking myself well protected by my mosquito-curtain, when I was awakened by a noise. On waking up I heard a buzzing as if my room was turned into a great beehive. My night-light was extinguished, probably by the insects which I heard in my room having flown into it; but a little light from a gas-lamp coming through the window showed me the outside of my white mosquito-curtain covered with insects, which seemed to be some kind of wasps. Of course I had no wish to leave my place of protection; but I soon saw that my mosquito-curtain was not so well closed as I had thought, and that some of the dreaded animals had already discovered

the opening left by my carelessness. The only safety now lay in a determined resolution: I suddenly tore open the curtain, and threw my pillows so that I could jump upon them and reach the door of the room without the danger of stepping with my bare feet on the wasps, which probably covered the floor of the room; and so I got out of it. I then called to my servants to bring a lighted candle. As soon as they saw the animals they declared that they did not sting, and handled them without fear. Thus reassured I went back to my room, and saw that it was filled with insects, which appeared to have come up as full-grown termites from a hole between the stones of the floor. It is clearly the habit of termites to live in the ground in their imperfect condition, and, when perfect, the winged specimens fly away. They thought little of the fitness of time and place when they ruthlessly disturbed my rest. It was nearly an hour and a half before they had all flown out to a light set outside the room to attract them. About a year afterwards the same thing happened in the same room. I sent the insect to the Netherlands—to the Leyden Museum; and it has been determined by Ritsema to be *Dorylus Klugii*, Hagen.

LIFE-HISTORIES OF SAWFLIES.

Translated from the Dutch of Dr. S. C. SNELLEN VAN VOILLENHOVEN,

By J. W. MAY.

(Continued from vol. ix., p. 251.)

NEMATUS LUGDUNENSIS, *Voll.*

Nematus niger, antennis nigris, pedibus fulvis cum coxis et linea subtus in femoribus nigris, alarum stigmatibus in mare dilute fusco, in femina flavo, femineo abdomine aurantiaco, fasciis abbreviatis nigris.

It is no less singular than true that this species of *Nematus* is as yet undescribed. The descriptions in Swammerdam ('Bijbel der Natuure,' vol. ii., pp. 723—733, pl. 44, figs. 1—6), in Frisch ('Beschr. von allerley Insecten,' pt. ii., p. 22, pl. 4), in Hartig ('Aderflügler Deutschlands,' vol. i., p. 205), in Stephens ('Illustrations,' vol. vii., p. 36, No. 39, *Gallicola*), in A. Costa ('Fauna del Regno di Napoli,' pt. iii., p. 24,

pl. 65, fig. 3), do not apply to the perfect insect, which in this instance I have reared. The species of insect reared by Redi and Réaumur from willow-galls is uncertain, and it is equally so with regard to the species of *Nematus*, meant by Linnaeus under the name of *Tenthredo Gallæ foliorum Salicis*, and by Fallén and Dahlbom under that of *Nematus Saliceti*. Taking all this into consideration I thought it best to give my species a distinct name, in order to avoid all confusion for the future. It is quite clear that there are two species living entirely in the same manner within galls on willow leaves, one of which species was reared by Swammerdam, and perhaps by all the other above-named authors, at all events up to the time of the insect leaving the gall; the other species being the one I am now describing. All the published descriptions of the gall agree with what I have myself observed: this may also be said of the larva, if its more or less green, or gray, or yellow colour is left out of consideration. I cannot say much with certainty respecting the pupa, but in this state the *Hymenoptera* offer few or no specific characteristics, especially in the case of such nearly-allied species as *Saliceti*, *Vallisnerii*, and *Lugdunensis*. The imago, however, differ greatly in colour, especially the females; and I regard the entirely yellow stigma in that sex as a special characteristic of my species.

I shall endeavour to describe and figure the other species, which, also, according to Swammerdam, occurs in this country, and has been met with by Messieurs Snellen and Wtewaal.

I am not acquainted with the egg; most probably it is like that observed by Swammerdam, of an elliptical shape and semi-transparent.

I found the galls on our common white willow (*Salix alba*) and on the red willow (*Salix purpurea*). They were perfectly alike, projecting on either side of the leaf, smooth, shining, and of a red colour; that on the red willow, however, being generally somewhat larger. When young they are more filled up inside than later, when the parenchyma is almost entirely eaten out by the larva. The gall itself is nothing but a diseased swelling out of the parenchyma of the leaf. I must here especially call attention to the fact that the imago reared by me all came from galls of *Salix purpurea*.

On the 5th of September, 1869, I took home some galls on leaves of the first-named species of willow, which is here the commoner. I carefully cut one of the smallest into three pieces, and found in it a greenish white larva, scarcely one millimetre long. It appeared to me to have twenty legs; the head was black, and the body wrinkled. The gall was so grown together that there was hardly room for the little animal; fig. 3 was drawn from this specimen. It speaks for itself that this larva soon died. The remaining galls dried up, and I determined to look for others. However, the matter was put off; and the winter came without my having made any further observations.

On the 31st of August of the following year I came across a clump of the red willow on the downs near Noordwijk, having almost all the leaves covered with large pear-shaped galls projecting from either surface: they were pretty well double the size of those of the white willow. I could see that some of the inhabitants had already left their dwellings, as in some cases a little round hole was visible in the gall; fig. 2 represents one of these galls. The larvæ which I found in them differed much in size and age; the larger number, however, were full grown, and these were of the size of fig. 4, that is to say nine millimetres in length. One of these, magnified, is shown at fig. 5. The head was shining black; the body brownish yellow, in some cases with a greenish tinge; in others the head was gray, with black marks on the legs, and having the body more of a gray colour, with a red tinge in the middle, especially on the back. There were in all twenty feet.

This account of the larva differs from the description given by Swammerdam and others, in this—that the later observers describe the full-grown larva as being more green than the young ones, while with me the more advanced larvæ were yellower, or more of a nut-colour.

I placed the willow leaves, which I had collected, in a confectioner's glass, with some mould at the bottom; I had not been able to bring home any whole branches. This prevented my having the opportunity of observing whether the larvæ, as is stated of the described species, bite a hole in the gall when the latter has become filled with excreta, and protrude the anus through the hole for the purpose of

relieving the body. I was only able to note that when they required no more food they escaped by a hole which had been gnawed in the gall, and hid themselves in the mould, where they spun a small oval cocoon of grains of earth. I first observed the imagos in the beginning of May; these were males. The females did not make their appearance till about twelve or fourteen days later. The following is a description of the sexes:—

Male.—Length five millimetres (see fig. 6). Head very broad, with projecting eyes, shining black, wrinkled on the vertex about the three ocelli. Trophi brownish white, apex of the mandibles brown, palpi gray. Antennæ entirely black, nearly as long as the body, moderately thick, and covered with a microscopic pubescence. Thorax shining black, excepting the extremities of the prothoracic lobes and the tegulæ, which are pale brown, and the cenchri, which are of a gray colour. Abdomen conical, with a carenite elevation on the dorsum, shining black, excepting the valve of the anus and generative organs, which are sordid orange (see fig. 8). Wings iridescent, costal nervure and stigma sordid yellow or gray, the other nervures black. Coxæ black; femora reddish yellow, with a black longitudinal line on the under side commencing at the base, but not reaching the apex; tibiæ pale orange, the posterior pair having the apex black (fig. 7); anterior tarsi reddish yellow, with the last two or three joints brown; posterior tarsi black.

Female.—Broader and more robust than the male, so that being of the same length it has the appearance of being shorter (see fig. 9). Head more projecting in front, so that it is more quadrangular; forehead smoother, black. Trophi the same as in the male. Antennæ somewhat shorter and thinner, black, glabrous. Thorax black, with broader orange-coloured extremities of the prothoracic lobes; tegulæ also of the last-named kind; cenchri dark gray, almost black. Wings iridescent, with pale yellow costal and post-costal nervures and stigma, the last named being particularly large; the remaining nervures blackish. Coxæ black, with yellow tips; femora and tibiæ orange, the four anterior femora with a small black longitudinal line underneath; apex of posterior tibiæ brown; three joints of the anterior and intermediate tarsi and the posterior tarsi entirely dark brown. Abdomen orange, excepting the first two segments and fasciæ on the

dorsum of the five or six following, gradually decreasing in extent, which are black. The deep black ovipositor is in striking contrast with the orange tint of the terminal segments; above it, on either side, are two white projections, with dark tips.

It is apparent from the above that my species differs greatly from that of the other writers. Swammerdam speaks of imagos entirely black, with black legs. Hartig observed no brown or yellow on the pronotum, and does not mention the abdomen or legs as having any orange tint, or that the stigma is yellow, in addition to which his description of the neururation differs from that of our species. Frisch seems to have found a species of *Pimpla* to be parasitic on his species. *Nematus gallicola*, Steph. (Westw. MS.), agrees pretty well as regards the coloration of the body and the legs, but differs in the colour of the stigma; it also appears that the trophi are black, and I see no mention made of the black mark on the femora. I have not thought it worth while to refer to Lepeletier's *Monographie*, as one cannot, as a rule, glean much from his descriptions, on account of their incompleteness.

The difficult question now remains, and it is one I shall not take upon myself to decide: Is *N. Lugdunensis* nothing more than a variety of *Vallisnerii*, brought about by its inhabiting the red willow? Would *Lugdunensis*, if transferred to the white willow, become *Vallisnerii* after one or two generations? So much is certain, that both in the larva and the imago the principal distinction consists in difference of coloration. It is only by making experiments on a large scale that this question can be determined.

POLIA FLAVOCINCTA LARVA FEEDING ON MAGNOLIA.—Two years ago a friend planted a young *Magnolia grandiflora* against the wall of his house, and last July was much vexed to find the greater part of the leaves more or less eaten and disfigured. After several evenings search he brought me the culprit,—a full-fed lepidopterous larva, which I failed to recognise until the imago emerged to-day. It turned out to be *Polia flavocincta*. This larva is known to be polyphagous enough with regard to low plants; but its attacking the hard, evergreen leaves of *Magnolia*, in a large garden, seems worthy of record.—EDWARD A. FITCH; Maldon, Essex, Sept. 29, 1877.

NOTES ON THE EGG AND DEVELOPMENT OF THE PHYTOPTUS.

By E. A. ORMEROD.



1. *Phytoptus* egg. 2. Egg showing contents. 3. Embryo *Phytoptus* as seen in turpentine. 4. Egg pellicle near hatching, showing striæ. 5. *Phytoptus* emerging from the egg. 1, 2, 5. From birch bud-galls. 3, 4. From leaf-galls of *Viburnum Lantana*.

THE extreme minuteness of the *Phytoptus* makes the study of its early stages and habits one of great difficulty; but by careful watching during the past summer I have gathered a few fragments, which, though disjointed and dispersed amongst various species, may still be of some interest.

The especial point in view was the egg. This, or at least an egg-shaped body from which a small but fully developed *Phytoptus* was excluded, I had previously found (Entom. x. 86) about the beginning of February in some numbers in the *Phytoptus* bud-galls (witch-knots) of the birch. What I then found were of a blunt oval form, produced at one end, transversely striate like the perfect *Phytoptus*, and becoming very irregular in shape before its exclusion; and, continuing the search, I found at the beginning of August what I take to be the earlier state of this egg. In this the egg is of a perfectly regular ovate form, larger at one end than the other, and without striæ; sometimes also slightly produced at the extremities as from pressure of the contained creature, and sometimes also when the time of hatching was at hand these eggs were to be found, as before, with the pellicle striated, the shape completely irregular, and the *Phytoptus* in the act of exclusion; and towards the end of August eggs were still to be found of a regular obtuse oval, till driven out of shape by the living tenants.

These various stages of the birch witch-knot *Phytoptus* are figured above, numbered respectively 1, 2, 5, and show the egg, the egg slightly altered, and the process of hatching; two intermediate stages are shown in figures 3, 4. These were from the pubescent *Phytoptus* galls on the leaves of *Viburnum Lantana* (wild guelder-rose), gathered on the 6th of August, at Wootton-under-Edge, in Gloucestershire, and show in one case (3) the clearness with which running a little turpentine over one of the egg-like bodies at the proper stage of development displays the figure of the gall-mite, and in the other (4) the presence of the striæ and the somewhat irregular form which appears to precede hatching.

In the case of the lime gall-mite I found a similar egg amongst *Phytopti* roaming about beneath the leaf, and also one slightly more obtusely ended in the *Phytoptus* gall of the sallow leaf, but not having more advanced specimens to verify their contents by I cannot be absolutely certain of the nature of these eggs.

Looking at the progression (1 to 5, as figured) from the egg in its perfect form through the very gradual steps to the exclusion of the gall-mite, it appears to point to the smooth, obtuse, oval body being the true *Phytoptus* egg, and that the *Phytoptus* is excluded from it, as far as external form goes, in perfect development. I have never seen the gall-mite free itself entirely from the egg pellicle; but whether in the smallest size, corresponding with those of which only a portion showed projecting from the egg, or in the largest growth, I have not met with any variation of characteristics beyond colour and slight differences of figure. In autumn, as far as examination goes of the lime tree and common maple infested by *Phytopti*, the mite may frequently be found straying on the under side of the leaf, on the twig, and also sheltering in the crannies at the base of the leaf-bud, rather than in the galls; the mite-galls appearing sometimes entirely empty, sometimes inhabited.

On the maple leaf the galls vary much in size and shape, from the common irregularly-formed clustered and reddish galls of the upper side of the leaf (*Cephaloneon myriadeum*, Bremi), to the larger solitary kind in the axils of the veins, possibly the *Cephaloneon solitarum*; but in the specimens before me the steps from one form of gall to the other are so

gradual that I am unable to differentiate them. Beneath the maple leaves are (occasionally) a few very similar to these larger ones, but still more sparingly distributed, and differing like the surface on which they are placed in being more hairy, the aperture being commonly a simple depression into them from the upper surface of the leaves, whilst a fourth form or species appears beneath the leaf in swollen tubercular clusters, also pubescent, and often forming a ring on the under side of the leaf surrounding the aperture of the gall above.

During the last week of September pale yellowish fawn-coloured *Phytopti* were still to be found in some of these galls, and a little later I found a plentiful sprinkling of them amongst the hairs on the back of the leaf, or walking briskly along the maple twig; and on the 8th of October they were to be found on the maple buds, and on tearing this bud to pieces they were noticeable among the scales at the base, not apparently inside, but clinging where the leaf-stem and twig most sheltered the leaf-bud.

On the lime I found the *Phytopti* straying about the leaves on the 11th of September; and on the 12th of October they were to be found both beneath the leaf and—as in the maple—at the base of the leaf-buds. Some of these nail- or rather pointed cowl-like galls were on leaves of *Tilia grandifolia*, and relatively to these the legend given in Sir E. Smith's 'English Flora' (vol. iii., p. 21), may be of some interest,—of the old limes of this species in the churchyard of Sedlitz, in Bohemia, which were reported to have borne miraculously hooded leaves ever since the monks of a neighbouring convent were executed on them. An examination into the matter by some passing entomologist might give us an earlier date than we have at present for the observation of *Phytoptus* galls.

In the case of the birch "witch-knot" *Phytoptus* we have the hibernation of the gall-mite clearly in the diseased buds, though they may be elsewhere also; but in lime and maple the drying of the gall on the deciduous leaf, or the presence of decay or fungoid growths unfitting it for its tenant, naturally point to the fitness of the mite leaving its fallen home to seek a securer shelter. Its dispersion to neighbouring trees would also be brought about by the mite-

tenanted leaves being wafted by the wind and settling on the branches; and its living powers appear strong, as in specimens I have washed from the leaves, I have found vitality remaining after immersion of more than an hour and a half, in water with sufficient chloroform in it to be appreciable to taste and smell.

In the progress of search I have sometimes seen *Acari* in *Phytoptus* galls, and frequently found the *Phytopti* roaming amongst *Acari* on the exterior of the leaves; but though I have found the gall mite emerging as sketched (fig. 5), and also found empty pellicles showing the casting of the skin, yet even in the largest size—and especially on the 12th of October, when I had clear views with a quarter-inch glass of the mite as a transparent object inside the loose pellicle it had been about to cast—I have not seen any indications of steps from the typical form of the *Phytoptus* to that of any other *Acarid*.

Isleworth, October 13, 1877.

LIFE-HISTORY OF HELIOTHIS ARMIGERA.

By W. H. TUGWELL.

THE eggs of this species are extremely small for the size of the insect, nearly round and slightly striated, of a pale yellowish green, becoming a trifle darker before hatching, which takes place in five or six days. As the parent moth continues to deposit a few eggs each night for a period of fourteen days, and probably for a longer time when at liberty, those first deposited are hatched, and change skins once or twice before the last eggs are laid. Some of the first larvæ feed up rapidly, and become imagos the same season; but the bulk lie over in pupæ till the following year. The young larvæ are very sluggish, moving little, and eat only the lower surface of the leaf of the garden geranium or other food-plant. For the first fortnight they content themselves with this mode of feeding; they then commence to eat holes quite through the leaves, and no sooner is the hole sufficiently large to admit the head than they slowly crawl through it, only to eat another, and again and again repeat the process, so

that they soon make a plant look as if it had been riddled with shot. They also now commence to eat round holes into the succulent shoots and stems, burrowing quite into the plant, and evince a strong liking for the buds and flowers. They would soon prove most unwelcome guests to any lover of his bright-flowered geranium beds. An entomologist would most likely be glad to sacrifice Flora to his aurelian pet; but a gardener would wage a war of extermination. When about half grown the larvæ become terrible cannibals, eating their brothers or sisters with a zest and pertinacity quite horrible. They are mean and cowardly, generally seizing their weaker and more helpless brethren when about to cast their skins. As they became full fed they appeared to hold each other in mortal fear, and, like most guilty people, lived in constant dread of being arrested for past offences, for when touched by another larva, ever so slightly, they would wriggle, twist, and throw themselves off the plant to escape a fate they had possibly inflicted on others. When full grown and extended they are about an inch and a half long, of moderate thickness, slightly attenuated from the middle, both anteriorly and posteriorly; the head is about the size of the anterior segment, shining brown, slightly mottled with darker shades; on second segment is a coriaceous shiny plate or skin, giving it the appearance of being wet; the dorsal and medio-dorsal area is of a raw sienna-colour tinged with green, and pencilled in fine broken parrallel lines of yellow and darker shades, varying a little in tone in different individuals, but to no very great extent; there is a slight and interrupted dorsal line, formed by two fine oblong dark spots, edged with yellow on each segment, and a still more indistinct medio-dorsal line produced by four or six dark-coloured small warts, two or three on either side of each segment, and each emitting a short bristly hair; the spherical line is sharply defined, of a pale ochreous, lined above, first with a fine yellow and then a dark umber line, and below by a white line; the legs and claspers are pale ochreous; ventral surface a colourless gray, with three white lines. The pupa is subterranean; and the moth appears in August, September, and October.

3, Lewisham Road, Greenwich.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PAPILIO MACHAON IN SUSSEX.—When in Brighton on Saturday last I was informed, on good authority, that two larvæ of *Papilio Machaon* had been found in July last, feeding on carrot, in a field near the Brighton Race Hill; and that an imago of this species had been captured near Hastings in August last. If we add these captures to those recorded by Mr. J. Jenner Weir, in the October number of the 'Entomologist' for 1876, and by Mr. A. B. Farn, in the October number of the 'Entomologist' for 1877, we find that no less than ten specimens of this insect, either in the larva or imago state, have been recorded from Sussex and Kent during the last twelve months. From the fact that these specimens have been found in four different localities, three of which are a considerable distance apart, it seems improbable that they were purposely introduced.—H. Goss; Surbiton Hill, Surrey, October 12, 1877.

THECLA QUERCUS FEEDING ON SALLOW.—I have on several occasions in May and June beaten the larva of *Thecla quercus* from willow, which has been growing in the woods among oaks, but I always thought they had got there by being blown down or falling by accident from the oaks above; but to my astonishment when passing through the same wood on August 29th I saw a female at rest on a willow. Pulling down the branch very carefully I saw that she had deposited an egg on the leaf on which she rested. I boxed her, and she obliged me with another egg, so that I could compare them; which I did, and found them identical. I then sent the egg and leaf on which it was deposited to the Rev. J. Hellins, who at once recognised it as the egg of *T. quercus*. Can we now venture to say that the food is willow as well as oak?—G. C. BIGNELL; Stonehouse, Plymouth, September 21, 1877.

BREEDING COLIAS EDUSA.—Beginning of August, two females captured; from August 11th to 15th, eggs laid on *Medicago sativa*; 16th to 20th, eggs hatched. September 28th, first larvæ attached for changing. October 8th, first pupæ. A number of the larvæ still feeding. The majority of those which attached themselves for changing died before the process of pupation was completed. Were fed on lucerne (*Medicago sativa*). I have also some larvæ feeding, bred

from females captured August 16th and 18th, and September 2nd. The female captured on the latter date lived until September 26th.—A. J. WINDYBANK; Kingston-on-Thames, October 15, 1877.

COLIAS EDUSA, *ACHERONTIA ATROPOS*, AND *SPHINX CONVULVI* AT HARWICH.—This year *Colias Edusa* has been very abundant here. A considerable number of pupæ of *Acherontia Atropos* have been found here this autumn. When taking up potatoes one man informed me he destroyed nine before he knew what they were. Two specimens of *Sphinx convolvuli* were captured here on September 3rd and 7th.—F. KERRY; Harwich, September, 1877.

ACHERONTIA ATROPOS.—This species has appeared in this locality (Norwich) in the larva state in sufficient numbers to be worthy of note. I have, as well as many of my friends, obtained several larvæ and pupæ, one of which made its appearance on the 30th of September, but was unfortunately a cripple, the wings not being developed. I am anxiously awaiting the emergence of the others.—ROBERT LADDIMAN; Upper Hellesdon, Norwich, October 19, 1877.

SPHINX CONVULVI AT PUTNEY.—A specimen of this insect was captured by a friend of mine, at Putney, September 5th.—ARTHUR J. ROSE; Mutlah Lodge, College Avenue, Hackney.

DEILEPHILA LIVORNICA.—I was staying at Shanklin in the early part of August, and happening to go into a jeweller's shop there, kept by a Mr. Billings, saw a specimen of *D. livornica*, which had been brought alive to him by a little girl a day or two before. He kindly gave it to me; but unfortunately it had been set with a common pin, and was minus the antennæ. On getting it home I relaxed and re-set it; and with the exception of these defects it is a good specimen.—JOHN LOGAN SHADWELL; Malvern House, Thicket Road, Upper Norwood, Surrey.

DICRASURA BICUSPIS AND *ACRONYCTA ALNI* IN STAFFORDSHIRE.—On June 13th last I had the good fortune to find a fine male *Dicranura bicuspis* on one of a row of alder trees, about three miles from this place. It was close to its cocoon, from which it had evidently emerged that afternoon. About five years ago we took one in exactly the same manner on another tree in the same row, not more than three or four yards away. It struck me at the time that I would, later in

the season, try the same trees for the larva of this species; so on August 25th I set to work with the beating-net, and beat all the lower branches, such as I could reach. The result was no larvæ of *D. bicuspis*; but, what was quite as good, I took no less than five larvæ of *Acronycta alni*—two of them nearly full fed, and the other three in the earlier stage, so well described, in the September 'Entomologist,' by your correspondent Mr. J. P. Barrett. Two of these three certainly, if not all of them, moulted twice before assuming the well-known appearance of the full-fed larva. The earlier moult in no way altered the dingy colour described by Mr. Barrett, except, as would be expected, it became somewhat brighter, or rather less dingy; the same close resemblance to a bird-dropping remained; but the final moult produced a marvellous transformation—from a dirty white, of more or less intensity, to a bright purple-black, with glorious golden dashes, is a truly wondrous change, hardly to be credited if not seen. In the earlier stages there are indications of the remarkable clubbed hairs, so characteristic of the full-grown larva; and the habit of bending back the first three segments close to the body when asleep on the surface of a leaf is the same. Having been so fortunate I beat a few days later some more alder trees hard by, but with no success, so I determined to beat the same trees over again. I did so on September 5th, and got two more, both nearly full grown. They have fed up but slowly; and the last of the seven only went into pupa yesterday. I have them all safe in bits of hollow stick; and next June I shall be all anxiety to see the result.—[Rev.] T. W. DALTRY; Madeley Vicarage, Newcastle, Staffordshire, September 25, 1877.

ACRONYCTA ALNI NEAR DERBY.—We have been fortunate enough to pick up three larvæ of *Acronycta alni* this season: one, August 14th, from a sloe bush under alders; a second, September 7th, beaten from low poplar suckers, also at the roots of an alder; and a third, September 19th, from the heart of a standard apple tree, some ten feet from the ground, no other kind of tree near. All three occurred within a quarter of a mile of this house. They had undergone their last moult, and donned that handsome livery of black tagged velvet turned up with gold, which is so different from the sober costume of their earlier stages, described by Mr. Barrett in the 'Entomologist' (Entom. x. 237). That gentleman,

by-the-bye, will find his savoury similitude for it forestalled in a communication of mine to the E. M. M. for November, 1868, vol. v., p. 144. Nos. 1 and 3 spun up safely in dried stems of *Heracleum* provided for them. No. 2 was unfortunately wounded by the beating-stick.—[Rev.] HUGH A. STOWELL; Breadsall Rectory, Derby.

LARVA OF *ACRONYCTA ALNI* AT RUGBY.—On Thursday, September 28th, I found here a larva of *Acronycta alni*, which had unfortunately been trodden on by a passer-by, so that its tail was crushed; and this I fear makes it impossible that it should come to maturity. Still the capture is no less worth recording. I may mention perhaps that the last time *A. alni* was recorded as taken in this neighbourhood was just twenty years ago, when two larvæ were taken by me in the school close here, both of which died in the larva state. In all these cases the larvæ were taken on or near elm trees.—ARTHUR SIDGWICK; Rugby, September 30, 1877.

HELIOTHIS ARMIGERA NEAR HARTLEPOOL.—On September 5th a female of *Heliothis armigera* was taken here by Mr. J. Burn, who occasionally collects for me. It was captured about nine o'clock at night, when flying round ragwort flowers. This is the first time the species has occurred in this locality, though the food-plant is excessively abundant.—JOHN E. ROBSON; Hartlepool.

LEUCANIA ALBIPUNCTA AND *L. VITELLINA* IN THE ISLE OF WIGHT.—On September 1st I took at sugar, in the Isle of Wight, a very fine specimen of *L. albipuncta*, and another on the 5th; and also on this evening one *L. vitellina*.—J. KESWARD; 14, Effingham Road, Lee.

CAPTURES IN STAFFORDSHIRE.—I have been pretty successful in taking the usual birch and alder larvæ, namely, *Acronycta leporina*, *Notodonta dictæoides*, *N. dromedarius*, *Platypteryx falcata*, *P. lacertula*, &c.; the last three being tolerably common. Sugar has been no use at all in this district all the year, and I have scarcely taken a moth by means of it. *Eupithecia debiliata* was very plentiful in July: in two short afternoons I took over one hundred and thirty; but insects have generally been scarce here. The spring was very late, and the summer has been very wet and cold; indeed, we have had little else but rain for more than twelve months.—[Rev.] T. W. DALTRY; Madeley Vicarage, Newcastle, Staffordshire, September, 1877.

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VARIETY OF *CLEORA GLABRARIA*.

By H. Goss, F.L.S., F.Z.S., &c.



CLEORA GLABRARIA (VARIETY).

THIS variety of *Cleora glabraria* was captured in the New Forest about four years ago, by Mr. Gulliver, of Brockenhurst, from whom I obtained it.

In typical specimens of this species the wings are dingy white, dusted with small black dots; but in the specimen figured above the black dots are so numerous and so minute as to give the insect a dark and smoky appearance, and to render some of the ordinary markings very obscure. The central spot is larger but less clearly defined than usual, and with the spot on the costa, with which, as in ordinary specimens, it is connected, forms a dull blotch. Most of the usual spots and markings are confluent, but the second line is much more sharply defined and more acutely angled than in typical specimens, and is bordered with white on the side nearest the hind margin. Of the three species of the genus *Cleora* occurring in this country, *Glabraria* is, according to my experience, less liable to variation than either of its congeners. This fact renders this specimen additionally interesting.

During the last ten or twelve years a considerable number of specimens of this species, both bred and captured, have come under my observation; but, with the exception of the striking variety figured above, I have never remarked in any of them any noticeable departure from the usual markings and colouring, though specimens vary considerably in size.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assist.-Naturalist in the Museum, Royal Dublin Society.

No. V. NYMPHALIDÆ—ELYMNIINÆ AND MORPHINÆ.

THE subfamily *Elymniinæ* contains but two genera,—*Elymnias* and *Dyctis*: the cells of all the wings are closed, the costal nervure of the fore wings is much swollen at the base; and the males are furnished with pencils of hairs on the hind wings. The larvæ have cephalic spines, forked tails, and a smooth skin. All the species, except two, which are African, are Indo- or Austro-Malayan, and most of them mimic other butterflies—*Danaus*, *Euplœa*, *Tenaris*, *Delias*, and *Acræa*; they may, however, readily be distinguished from all these genera by their dentated, and often angulated, wings. They are generally dark-coloured insects, with the fore wings either plain or spotted with blue or white, and in many species the hind wings are bordered with orange. The female of *E. undularis* mimics *Danaus Chrysippus*: it is tawny, with broad brown borders spotted with white on all the wings; towards the tip of the fore wings the spots are confluent, and form a band. The African species—*Dyctis Phegea* and *Bammakoo*—mimic different species of *Acræa*: the fore wings are brown, banded with fulvous in the former and white in the latter; the hind wings in both species are brown, paler towards the base, and covered with brown striæ. On the under side most of the *Elymniinæ* are finely striated with brown, and the group has a family likeness, which renders it easy to recognise, in spite of its resemblance to other butterflies. *Dyctis Agondas*, of New Guinea, which mimics the genus *Tenaris*, is dirty white, with brown borders, and two or three large blue spots on the hind wings.

The *Morphinæ* are a group of butterflies perhaps only artificially separated from the *Nymphalinæ*. Some of them approach the *Satyrinæ* in appearance, and probably in habits; but the typical genus *Morpho* comprises some of the largest and most splendid butterflies known, and, except a superficial resemblance to the *Brassolinæ*, cannot be confounded with anything else. All the genera, except *Morpho*,

which is Tropical American, are East Indian. The hind-wing cells of the imago are open (which separates them from the *Brassolinæ* and *Satyrinæ*), and the larvæ of many of the genera have forked tails, thus approaching the *Satyrinæ* and *Brassolinæ* on one side, and some of the true *Nymphalinæ*—such as *Apatura*—on the other. We will now consider the principal genera of the *Morphinæ* separately.

Amathusia Phidippus is a brown Javanese butterfly, four inches across, with rather pointed fore wings, and with the hind wings produced into a short and very broad tail; beneath, the hind wings have two large brown eyes dusted with yellow, with white pupils marked below with black, and enclosed in yellow and black rings; each angle of the broad tail is marked above and below with a black spot, bordered outside by a white crescent. It flies at dusk, like some of the *Satyrinæ* and *Brassolinæ*. A few allied species are found in North India, Java, and Sumatra.

The species of *Zeuxidia* also come from the Malay and Philippine Islands. Most of the species are dark brown, banded and spotted with blue on the fore wings and near the margins of the hind wings; the under side is brown, with a transverse darker line across all the wings, and with two small eyes on the hind wings. The wings of *Z. Luxerii* are more pointed than in *Thaumantias* (mentioned below), but are not hooked, as in *Kallima*, a genus of *Nymphalinæ*, to which it has some resemblance; and the hind wings are produced into a short, pointed tail, marked with white below. *Z. Aurelius*, Cram., from Sumatra, is one of the largest Old World species of the group: it is six inches in expanse, chestnut-brown above, and darker towards the margins, which are marked with rows of large white spots; the under side is striped with white and pale brown.

The species of *Discophora* are brown, with the fore wings more or less pointed, and the hind wings dentated, and generally angulated; there is a large silky patch of scales on the hind wings of the males; the fore wings have two or three rows of blue spots towards the hind margins, or are banded and spotted with tawny, and the hind wings are either plain or spotted with tawny; there are also two small eyes on the under side of the hind wings. This genus is met with from North India to Timor and Gilolo.

Enispe is confined to continental India. The species resemble large Fritillaries, being tawny, with brown borders, and broad zigzag brown markings on all the wings; the hind wings have two very small eyes beneath. The genera of *Nymphalinae*, which it most resembles, are *Cirrochroa* and *Cynthia*; from the latter it may be superficially distinguished by its rounded hind wings, and from the former by the heaviness of the dark markings above, and the absence of a silvery line and of a row of small spots beneath, which are found in most *Cirrochroa*.

The species of *Tenaris* are found as far west as Java, and east to Otaheite, but are most numerous in the Papuan Islands. The genus is one of the most unmistakable among butterflies. The species average about four inches in expanse, and are brown, more or less mingled with white; the hind wings have two large black eyes enclosed in broad, yellow, and narrower brown outer rings, containing a small white pupil surmounted by a bluish crescent. The species differ chiefly in the amount of white on the wings and the distinctness of the eyes above.

The species of *Clerome* resemble the *Satyrinae* more than any other butterflies of this group. They are two or three inches in expanse; several are tawny-brown above, and are distinguished by their under sides. *C. Eumeus* has a more distinct tawny band across the fore wings above, and a row of white spots across all the wings beneath; *C. Arcesilaus* has a row of small yellow dots beneath; and *C. Phaon* and *Stomphax* have two large eyes on the hind wings beneath; the former has a narrow yellow stripe, and the latter a broad white one on the fore wings beneath. *C. faunula*, from Malacca, is a larger species: fore wings pale brown; hind wings buff; beneath dirty white, with broad zigzag black lines; the inner margin of the hind wings is rich fulvous, especially below.

Thaumatias, the last of the Old World genera of *Morphinae*, also comes nearest to the American genus *Morpho* in size and beauty, the species measuring from four to six inches across the wings. The smaller species, *T. Odana*, *Diores*, &c., are dark brown, with suffused bluish purple markings, sometimes extending over a great part of the wing, and sometimes occupying only a limited portion

of the surface; the hind wings have two distinct black eyes beneath, more or less surrounded with yellow. Of the larger species, *T. Aliris* has a broad white band on the fore wings, and one or two white spots on the costa nearer the tip; the hind wings have two yellow blotches on the hind margin, the one at the anal angle very large; on the under side there are two very large eyes. *T. Howqua* is rich tawny, with irregular black spots on all the wings above; beneath there are five red eyes on each wing, with white pupils, and yellow and black outer rings. *T. Nourmahal* is similar, but reddish brown, with a dull tawny band across the fore wings, and a row of tawny spaces between the black marginal spots; on the under side there are but two eyes on the fore wings, and three on the hind wings, the intermediate ones being merely red spots. *T. Camadeva*, from North India, is the commonest of the large species: towards the base it is tawny-brown, darker outwardly on the hind wings; the disk of the fore wings, a row of marginal spots on all the wings, and a larger second row on the hind wings, is iridescent bluish white, with an outer row of square black spots, and more or less traces of a second row of round ones on the fore wings; each wing has five red eyes beneath, nearly as in *T. Howqua*, but larger. A species closely allied to *Camadeva* has been described from Cambodia.

No one can mistake the great South American species of *Morpho* for any other butterflies: they are slender bodied, day-flying insects, with a row of eyes on all the wings beneath; the wings vary a little in shape, being much longer and narrower in some species than others; they are generally dentated, and are occasionally produced almost into a short tail; they vary from about three to eight or nine inches in expanse. We may take *M. Perseus*, *Laertes*, *Æga*, *Sulkowskyi*, *Cypris*, *Menelaus*, and *Achilles*, as the representatives of groups. *M. Perseus* is of a rich dark brown, with the base of all the wings grayish blue in the male, except a broad brown space running from the base of the fore wings along the costa for two-thirds of its length. The female has the bluish portion replaced with orange on the greater part of the fore wings and the middle of the costa of the hind wings. The largest *Morphos* (*M. Hecuba* and *Cisseis*) are also of a prevailing orange tint. *M. Laertes* and

allies have broader wings, and are of a pale silvery blue, becoming almost white in some species, such as *M. Polyphemus*. They are about five or six inches across. *M. Aiga* is a small species, about three inches across; the male is of a rich metallic blue, with two white spots on the costa near the tip of the fore wings; the hind wings are pointed, and almost tailed at the anal angle; the female is dull orange, with one white spot near the tip, and the hind margins are brown, spotted with orange. *M. Sulkowskyi* is rather larger and of a similar shape, but of a paler, more violet-blue, showing different colours in different lights; the bands and eyes of the u.s. show through, especially in the female, which is bordered with brown on the fore wings, and has alternate narrow marginal bands of yellow and brown on the hind wings; the tip is brown in the male, and the anal angle is brown, with three small orange spots, in both sexes. The most splendid deep metallic blue of the whole genus is seen in the males of *Cypris* and *Rhetenor*. The male of the former has two rows of white spots, the inner forming a band on the hind wings; and the male of the latter has no white. The female of *Cypris* is dimorphic, being either blue or orange; that of *Rhetenor* is orange. These species measure about four and a half to six inches across. The species allied to *Menelaus* and *Achilles* are of a much less changeable colour, and have broader wings than those last mentioned. *Menelaus* is of a rich purplish blue, and measures five or six inches across; the margins are brown towards the tips of the fore wings, with a white spot in the male; in the female the borders are broader and spotted with white. *Achilles*, and the numerous species or varieties allied to it, vary from four to six inches across, and are brown, with a blue band across the middle of all the wings, varying much in breadth and intensity, and sometimes extending nearly to the base; the tips in the male and the hind margins in the female are generally more or less spotted with white.

The long-winged species of *Morpho* have an extremely lofty flight, sailing about the tops of the trees or along the alleys of the forest, from twenty to one hundred feet from the ground. Hence, with the exception of the New Granadan species (*M. Cypris*, *Sulkowskyi*, &c.), which are taken with long nets among the precipices of the Andes, and which may

occasionally be purchased at a comparatively moderate price, the only *Morphos* which are common in collections are *M. Menelaus*, *Achilles*, *Laertes*, and their allies, which have a rapid but undulating flight nearer the ground, on which they sometimes settle to suck the juice of fallen fruit.

The magnificent *M. Cypris* has occasionally been used in Paris to ornament ladies' head-dresses; but butterflies are far too fragile to be conveniently employed for this purpose.

Monographic revisions of the *Elymniinae* have been published by Wallace in the Transactions of the Entomological Society for 1869, and by Butler in the Proceedings of the Zoological Society for 1871. The Oriental *Morphinae* were monographed by Westwood in the former publication, 2nd series, vol. iv.

ENTOMOLOGY AT TRESCO AND THE SCILLY ISLES.

By the Rev. H. HARPUR CREWE, M.A.

DURING the latter part of August and the beginning of September I was the guest of Mr. Dorrien-Smith, at Tresco Abbey, in the Scilly Isles; and whenever an opportunity offered I investigated the Entomology of the islands. My investigations were, however, mainly confined to the Island of Tresco, upon which I happened to be located. I only visited the other islands occasionally, and always in the day-time, when there was very little stirring, though some of the downs or commons on St. Mary's, covered with *Ulex nanus* and *Calluna vulgaris* in full bloom, looked most tempting, and at night might very possibly have produced some good insects. I took nothing, however, worth mentioning, except a single specimen of *Heliothis peltigera*, which was flying in the bright sun over the heather. *Macroglossa stellatarum*, *Plusia gamma*, *Scopula ferrugalis*, and *Stenopteryx hybridalis*, occurred in myriads on all the islands. *Vanessa Atalanta*, *V. cardui*, and *V. urticae*, were most abundant; but I looked in vain for *V. Antiopa*, and did not see a single specimen of *V. Io*. The only other butterflies I came across were *Pieris brassicae*, *P. napi*, *P. rapae*, *Satyrus Janira*, *Polyommatus Phlœas*, and *Lycæna Alexis*.

On the islands of Tresco and St. Mary's there are some large fresh-water pools of great antiquity, thickly fringed

with reeds, and having on the former island a scrub of willow and heather growing close up to the water; but though I sugared the large masses of ragwort flowers carefully, I took absolutely nothing, except *Leucania impura* and *L. pallens*.

During the last fortnight of my visit I sugared the flowers of the numerous shrubby New Zealand *Veronicas* in the Abbey gardens almost every night. I took *Agrotis lunigera* (a single specimen), *A. tritici*, *A. puta*, *A. saucia*, *A. suffusa*, *A. segetum*, *Noctua plecta*, *N. C-nigrum*, *N. rubi*, *N. xanthographa*, *Cerigo Cytherea*, *Triphæna orbona*, *Apamea oculea*, *Phlogophora meticulosa*, *Melanthia rubiginata*, *Camptogramma bilineata*, *Eupithecia pumilata*, and a single specimen of the rare pearl, *Margarodes unionalis*. *Sphinx convolvuli* was common hovering over various flowers at dusk, but the specimens were all more or less battered. A single specimen of *Acherontia Atropos*, apparently fresh from the pupa, was brought to me by the gamekeeper, who caught it in his cottage. The gardener told me that the tomato plants had been much eaten by some large larva; I suspect *A. Atropos*. There is a good deal of *Euphorbia paralias* on the islands, and I searched it carefully for the larva of *Deilephila euphorbiæ*, but in vain. I described it to the gamekeeper, who is a very observant man, and he said he was almost sure he had seen it. The larvæ of *Eupithecia centaureata* and *E. absynthiata* were abundant on ragwort flowers, and I swept a few of *E. nanata* from those of *Calluna vulgaris*; but I saw no trace of any other *Eupitheciæ*. The only other larvæ I saw were *Hadena oleracea*, *H. chenopodii*, *Mamestra brassicæ*, *Dianthæcia capsicola*, *Chelonia caja*, *Acronycta rumicis*, *Arctia lubricipeda*, *A. menthastri*, and *Euchelia Jacobææ*. *Acidalia promutata* occurred on banks near the sea, at St. Mary's.

I omitted to say that *Colias edusa* was not nearly so common as in Buckinghamshire, where it has been more or less abundant since May. I did not see a single *C. hyale* or *Helice*.

An entomological friend, who had been a guest at the Abbey for some weeks before my visit, took, in addition to the insects already named, *Agrotis obeliscæ*, *Triphæna intersecta*, *Hadena pisi*, *Dianthæcia conspersa*, *Leucania littoralis*, *Lithosia quadra*, *Eupithecia subnotata*, *Cleora lichenaria*,

Ourapteryx sambucata, *Cledeobia angustalis*, *Stenia punctalis*, *Endotricha flammealis*, and *Herbula cespitalis*. I did not collect *Crambites*, *Tortrices*, or *Micros*.

This list is meagre in a climate where all the plants of Australia, the Cape, New Zealand, &c., flourish with almost native luxuriance.

The indigenous Flora of the islands, however, though select, is rather scanty. The past summer has been cold and ungenial; and the weather during my visit was often showery and rough. I quite think that anyone who worked the islands carefully from May till October would be amply rewarded.

The keeper of the lighthouse on St. Agnes told me that the glass was often covered with moths.

Drayton-Beauchamp, Tring,
October 31, 1877.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 251.)



Fig. 75.—*S. NERVOSA*.



Fig. 76.—*A. MARGINALIS*.

75. *Spathogaster nervosa*, Gir.—This rare gall may be found in May and the beginning of June on the leaves of *Quercus cerris* as a spherical swelling on a side-rib, about the size of a pea, and equally protuberant on each side of the leaf, in such a manner that either the whole rib with the

bordering tissue is inverted in the gall, or that that portion of the rib which joins the midrib remains unaltered, and only the outer portion becomes employed in its formation. It thus happens that the outer half of the gall lies at the edge of the leaf (as is generally the case with the galls of *Andricus curvator*). The gall occurs as a small ball at the end of this side-rib, or if, perhaps, composed of leaf parenchyma as a small lobe; sometimes the leaf margin shows as a seam on the periphery of the gall. The gall itself is, like that of *S. baccarum*, translucent, green, and covered, but not thickly, with very short branched hairs like the leaf. When the gall comprises the whole side-rib the leaf generally becomes curled up on that side. The section exhibits a soft parenchyma, with a cavity in the centre, in which the larva lives. The gall-fly appears at the middle of June.—G. L. MAYR.

This is a Turkey-oak species, consequently it does not occur in Britain. Dr. Mayr mentions *Synergus thaumacera* and *Callimome incertus* as inquiline and parasite, both appearing at the end of June or beginning of July. Both these insects are curiously inconstant in their life-history: that of *Callimome* has been referred to (Entom. x. 208), and *Synergus thaumacera*, Dalm. (= *Klugi*, H. = *luteus*, H. = *carinatus*, H.) is said to live in five widely separated Turkey-oak galls and three common oak species; also in some cases it appears in the summer of the first year, whilst in others it winters in the gall, and is not disclosed till the next April.—E. A. FITCH.

76. *Aphilothrix marginalis*, Schlechtendal.—Under this name Herr v. Schlechtendal has described a gall which, according to his account, is to be found at the end of April or beginning of May, and becomes mature by the beginning of June. The typical specimens now before me are on the leaves of *Quercus sessiliflora*, and grown through the leaf surface, some starting from the midrib, others from a side-rib. The galls are almost oviform, 2 to 3.6 millimetres long by 2 to 2.5 millimetres thick; in the dried state greenish yellow or brown (when fresh—on the authority of the describer—light green streaked with red), and more or less deeply ribbed longitudinally; the parenchyma of the gall is rather thin, and the chamber large. One example, which occurs on the midrib and is remarkable for its deep ribs, so

greatly resembles the gall of *Andricus quadrilineatus*, Hart., that I am unable to separate one from the other; and the probability that the producer is *A. quadrilineatus* cannot be overlooked.—G. L. MAYR.

In 'Mitteleurop. Eichengallen,' ii. 52, this species appears as ? *Cynips marginalis*; but, in 'Verh. d. zool-bot. Ges.,' xxii. 689, Dr. Mayr says he sees, from a specimen sent him by Dr. Meischner, that the gall-fly is an *Aphilothrix*. It is not known as a British species.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PAPILIO MACHAON IN KENT.—My brother took a perfect male specimen of *Papilio Machaon*, near Herne Bay, last August, and missed another. It is smaller than the fen specimens.—BERNARD COOPER; Higham Hill, Walthamstow, October 23, 1877.

VANESSA ANTIOPA, TRIPHÆNA SUBSEQUA, AND OTHER CAPTURES, NEAR HASTINGS.—The most notable of my captures in this neighbourhood during the last eighteen months have been *Vanessa Antiopa* (a fine female on a Cossus-affected tree, September 28th, 1876), *Apatura Iris*, *Sphinx convolvuli*, *Macroglossa fuciformis* (the broad-bordered species), *Selenia illustraria*, *Emmelesia unifasciata* (at dusk, Crowhurst Wood, June, 1876), *Stauropus fagi*, and *Triphæna subsequa* (bred from a larva found in Hollington Wood). I do not think this species is so rare as is generally supposed. I took it several years ago near Malvern, and remember its capture at Birdlip Wood, near Cheltenham; and now I know it as a Hastings and Petersfield insect. I have also taken the dark brown variety of *Strenia clathrata*, with a few white spots, but in a locality in which I never found one of the ordinary type. The *Lepidoptera* of Hastings seem remarkably similar to those of parts of Hampshire, especially the New and Woolmer Forests.—E. K. ROBINSON; Quebec House, St. Leonard's, October 19, 1877.

LATE APPEARANCE OF LYCÆNIDÆ.—On the 4th of October I took five specimens of *Lycæna Adonis*; two very small *L. Icarus* (*Alexis*), no larger than *L. Alsus*; and saw several *L. Corydon*, so perfect that they *might* be a second brood.

I saw *Sphinx convolvuli* on the evening of the 2nd of October, but missed catching it.—V. R. PERKINS; Wotton-under-Edge, October 25, 1877.

ACHERONTIA ATROPOS.—A fine specimen of *Acherontia Atropos* was captured in this neighbourhood on August 19th, this year. It was brought to me alive. Was not this an unusual time for its appearance?—H. MILLER; Ipswich.

[The appearance of this species seems altogether uncertain. Generally the imagos emerge in the autumn (October), but a very small percentage appears to pass the winter in the pupa state, and is developed early in the following summer (May and June). Probably your specimen was an unusually early example of this year's brood. It is also said that the autumn produced specimens are infertile; and this is doubtless true, as, considering the general food-plant (the potato), it is impossible that eggs can be laid in the autumn. I may state that the larvæ have been common in Essex this autumn.—E. A. F.]

ACHERONTIA ATROPOS AND SPHINX CONVULVULI AT SEA.—On the 8th of October an engineer of one of the Dublin Steam Packet Company's steamers brought me a live *Acherontia Atropos*, which alighted on a crate of cabbages on deck when twenty-five miles off the Irish coast; and on the 6th of October, last year (1876), *Sphinx convolvuli* alighted on the same steamer. Both insects are now in my collection.—T. WEST; 1, St. Leonard's Terrace, Ashfield Street, Liverpool.

SPHINX CONVULVULI IN WARWICKSHIRE.—I had the pleasure of receiving a specimen of *Sphinx convolvuli*, brought to me in fair condition, and taken at Kingswood, Warwickshire, September 20th, from some children who were playing with it.—G. H. MELSON; 68, Newhall Street, Birmingham, October 6, 1877.

CHEROCAMPA CELERIO AT EASTBOURNE.—A very fair specimen of *C. celerio* was brought me last Tuesday (October 30th). It was captured by a gardener amongst the leaves whilst sweeping a lawn.—W. E. PARSONS; 64, Langley Road, Eastbourne, November 5, 1877.

LAPHYOMA EXIGUA AT CAMBERWELL.—On the 13th of this month I was fortunate enough to secure at sugar, in the garden here, a fine specimen of *Laphygma exigua*, which I

identified this afternoon by the Doubleday collection, at Bethnal Green.—J. M. C. JOHNSTON; Tudor House, 203, Upper Grove Lane, Camberwell, October 27, 1877.

DIANTHÆCIA IRREGULARIS, ANTICLEA SINUATA, HELIOTHIS DIPSACEA, AND SPILODES PALEALIS.—The larvæ of *Dianthæcia irregularis* have this year been still more infested by ichneumons than usual: out of about sixty caterpillars I do not expect more than half a dozen moths. The larva of *Anticlea sinuata* has been fairly numerous at Lackford; so, too, that of *Heliothis dipsacea*. Several captures of *Spilodes palealis* have been made near Bury St. Edmund's, and also near Thetford.—[Rev.] A. H. WRATISLAW; School Hall, Bury St. Edmund's, November 1, 1877.

PARASITE OF BOMBYX RUBI.—In the October 'Entomologist' (Entom. x. 258) the discovery of a larva of *B. rubi* with some small cocoons adhering to its hairs was reported. These cocoons have also come under my observation this year; but I should certainly say that they *did* belong to the creature, and had not, as surmised, become accidentally attached to the skin. A large larva which I picked up in Woolmer Forest, on September 12th, had certainly nothing upon it at the time of capture; but during the journey home it evolved no less than six cocoons, and seemed none the worse for the operation, for it ate greedily, and crawled actively about. But the next day, when the production of several more during the night had convinced it that it was useless to struggle against fate, it curled itself up and died.—E. K. ROBINSON; Quebec House, St. Leonard's, Oct. 19, 1877.

[Cannot some correspondent supply us with either the name or specimens of this parasite? The study of parasitism generally is particularly interesting, and, as all who have studied *Hymenoptera* know, the economy of many species is particularly involved, and is likely to remain so in this country unless more individual records are kept. Probably no country contains a relatively larger band of lepidopterists, many of whom devote much time to the breeding of species. The number of despised *Ichneumonidæ* thus met with is large; but if lepidopterists would accurately ticket these species for naming and future record, the progress would be great. Not only would very important facts in the life-histories of the *Lepidoptera* and other orders—the preyed upon—be

established, but by this means the economy of the preyers themselves would be elucidated. It may be quoted as an instance of "our utter ignorance," that when Mr. Riley was in this country he attended the July (1875) meeting of the Entomological Society, and there expressed a wish for a supply of *Microgaster* cocoons for purposes of acclimatisation in America to lessen the ravages of the naturalised *Pieris rapæ*. The meeting was well attended, and the request was published in several journals; but it was not till some time subsequently that the question was raised by Mr. M'Lachlan, whether we have a *Microgaster* parasitic on *P. rapæ* at all; whether the well-known *Apanteles* (*Microgaster*) *glomeratus* is not exclusively confined to *P. brassicæ*. Such is, I believe, the case. At the December (1876) meeting of the Society Mr. Meldola related his experience; and during this year I have examined scores of larvæ and pupæ of *P. rapæ* without any sign of *Microgaster*; so if judgment may be allowed to go by default the purpose of Mr. Riley's request would be futile. But what a lesson to British entomologists: *Pieris rapæ*, our commonest and best observed butterfly, and the *Microgaster* cocoons, unlike many parasites, particularly observable.*—E. A. F.]

LEPIDOPTERA NEAR YORK.—In this neighbourhood the season has generally been a bad one, especially for larvæ; however, *Smerinthus ocellatus* has been plentiful, upwards of one hundred larvæ having been taken. I met with *Acidalia immutata* in the bog this year for the first time; I also saw several small larvæ of *Collia sparsata*, but did not take them, intending to do so later, but was prevented by the continuous rain. I have again bred the black variety of *Amphydasis betularia* (two males and one female); likewise three intermediate ones, one of which has a broad black border to the fore wings; the other two are black, dotted all over with white. I also bred a fine male *Cymatophora fluctuosa* this spring, from a larva taken in 1876. *Acronycta*

* On October 26th, 1877, Mr. W. C. Boyd found a larva of *Pieris rapæ* on a fence at Chestnut, on which was a cluster of the little yellow *Microgaster* cocoons. With his usual kindness Mr. Boyd gave them to me, after exhibition at the Entomological Society; so I hope to determine the species. The specimens were found after the above was written, showing that negative evidence is again at fault, but the lack of observation is still established.—E. A. F.

eporina has not occurred this season, but was common last.
—THOMAS WILSON; Holgate, York, October, 1877.

CAPTURES NEAR PETERSFIELD, HANTS.—My brother and myself in six weeks, ending September 19th, captured the following:—*Thecla pruni*, *Lycæna Ægon*, *Liparis monacha*, *Pachycnemia hippocastanaria*, *Thera variata*, *T. firmata*, *Noctua glareosa*, *N. neglecta*, *Anchocelis rufina*, and *Epunda lichenea*; very abundant. *Lithosia complana*, *Melanippe procellata*, *Scotosia undulata*, *Epunda nigra*, *Anarta myrtili*, *Stilbia anomala*, and *Hypena crassalis*; common. *Selidosena plumaria*, *Eupithecia succenturiata*, *Phibalapteryx vitalbata*, *Eubolia palumbaria*, *Platypteryx unguicula*, *Cænobia rufa*, *Luperina cespitis*, *Miana literosa*, *Agrotis puta*, *A. aquilina*, *A. agathina*, *A. porphyrea*, *Noctua plecta*, *Anchocelis litura*, and *Erastria fuscula*; a few specimens. *Apatura Iris*, *Limenitis sibylla*, *Emmelesia unifasciata*, *Camptogramma fluviata*, *Phibalapteryx lignata*, *Chesias obliquaria*, *Nonagria fulva*, *Triphæna subsequa*, *Cucullia asteris*, and *Plusia orichalcea*; single specimens. *Lobophora sexalisata*, *Dicranura bifida*, *Stauropus fagi*, *Clostera reclusa*, *Acronycta alni*, *Hadena pisi*, *H. thalassina*, *Cucullia lychnitis*, and *C. asteris*; larvæ. *Emmelesia unifasciata* was taken among some hazel and clematis bushes on Whetham Hill, August 18th: it was flying in bright sunshine, but most probably had been disturbed by my forcing a way through the clematis. *Plusia orichalcea* was beaten out of a hedge of clematis on Whetham Hill, about August 18th: it flew across the road and fell upon its back upon the path; I thought it was only *P. chrysitis*, and picked it up by one wing; my surprise may be imagined when I saw what a prize I had so carelessly secured; I have also met with a single specimen at rest in the daytime upon a flower-head of ragwort. *Triphæna subsequa* I took from my bedroom window. My brother found the larva of *Acronycta alni* on an oak bough in August last, at Harting Coombe, near Rake; it was then almost full grown, but soon died, a victim to ichneumons.
—E. K. ROBINSON; Quebec House, St. Leonard's, October 19, 1877.

LEPTOGRAMMA SCABRANA BRED FROM THE EGGS OF L. BOSCANI.—Having captured females of *Leptogramma Boscana*, on the 15th of July last, I placed them in a

large-mouthed pickle-bottle. I obtained eggs on the 17th of that month, laid on the sides of the bottle in little green patches. On the 24th I noticed little black specks in the eggs; the next day they hatched. Having placed some elm in the bottle and covered the mouth up with fine muslin, I turned it bottom upwards, and left it for a week. Upon examination I found the larvæ had curled the edge of the leaf over and fed on the surface. Having been supplied with fresh food they drew two leaves together, and fed on the surface as before. On August 20th they attained the size of half an inch, and came out of their web occasionally and fed on the edge of the leaf. On the 28th they drew two leaves together for the last time, for they were all in pupa by the 3rd of September. On the 29th the first imago appeared. It was, as I expected, a true *L. scabrana*. I have bred seventeen in all. The larvæ are pale green, with a few hairs scattered on each segment; head, plate on second segment, and feet, black. I think this is enough to prove that the difference in colour is merely a protection. *L. Boscana* is on the wing during the first and second week in July; while *L. scabrana* needs protection for seven months. I have found it at rest during the winter with its wings lapped round the twigs of the elm, which makes it very difficult to see. I have tried twice before to breed this insect. In 1875 I kept *L. scabrana* alive from October until March of the following year. They died without depositing eggs. In July, 1876, I had eggs of *L. Boscana* deposited in a chip box: they hatched, but I failed to rear them. It has been said that I must have made a mistake. I will ask one question: Does any entomologist know of a locality for the one that does not produce the other?—W. WEST; 6, Green Lane, Greenwich, November 10, 1877.

AROMIA MOSCHATA IN SCOTLAND.—A beautiful specimen alighted on the neck of a gentleman while fishing near Moniaive, sixteen miles from Dumfries, on September 3rd. He secured the insect, and presented it to me on his return; and Dr. Sharp now tells me it is the first one he has heard of in Scotland.—ROBT. SERVICE; Maxwelltown, Dumfries, N.B., November 8, 1877.

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VARIETY OF SATYRUS JANIRA.

By C. A. BRIGGS.



SATYRUS JANIRA (VARIETY).

THIS remarkable variety of *Satyrus Janira* was captured near Dover, by Mr. W. Purdey, of Folkestone, from whom I obtained it. The specimen is a female, and is in fair condition. Liable as this species is to variation in the depth of its colouring, I do not remember to have ever seen so fine an example of the bleached variety as this. A somewhat similar one, however, is described in Humphrey's 'Genera and Species of British Butterflies,' p. 14.

In the place of the ordinary colouring of the female of this species, the ground colour of the upper surface of the wings in this specimen is of an almost uniform drab, from which the usual orange blotch shows out with singular effect. In typical specimens of *S. Janira* (female) this blotch is the palest portion of the upper surface of the wings. In this variety it is the darkest; and the contrast when the specimen is placed among typical specimens is most striking.

Mr. Purdey informs me its appearance on the wing was so extraordinary as to leave him in doubt of the identity of the species until after its capture.

December 11, 1877.

A CONTRIBUTION TO THE ENTOMOLOGY OF IRELAND.

By JOHN A. POWER, M.D.

THE insect Fauna of England, Wales, and Scotland, and even that of the adjacent insular appendages, has of late years been so assiduously worked out by very numerous and energetic explorers of every kind, that apparently comparatively little remains to be done as to the discovery of new species of *Lepidoptera*, *Coleoptera*, or *Hemiptera*; although it is true that a persevering search does still turn up a few in the course of the year. The *Lepidoptera* seem nearly exhausted. The *Coleoptera* and *Hemiptera* afford a better chance, especially the latter, which have only been zealously investigated during the last few years, and that by a comparatively small number of entomologists, who have produced a list of species far more extensive than was at first expected. The *Homoptera*, though more limited in number, afford us the best field of discovery; but as yet there are very few workers, and we have scarcely even a satisfactory catalogue, much less description, of those which are known. The list will no doubt be very considerably extended when they have been farther investigated.

It is to be hoped that the smaller chance of success which now attends the mere collector of the *Coleoptera*, of gratifying his ambition to find "something new," will induce him to devote increased attention to the infinitely more useful and scientific study of their habits and life-histories,—a point in which the lepidopterists at present far surpass the coleopterists; though it is true that the habits of many of the *Coleoptera* render the investigation much more difficult. There seems, however, to have been a decided and healthy movement in this respect within the last few years in this country, and still more in America; and we have many most elaborately worked-out life-histories, more particularly of those insects which are hurtful to the crops and food, not omitting that great bugbear of all—"him of Colorado;" yet still very much more is required, and a grand field is in this respect open to the real entomologist.

In Ireland the Flora is, I believe, well worked out, like that of Great Britain; and few, if any, discoveries remain to be made in it; but our knowledge of the insect Fauna is in every branch most imperfect. We have a few, for the most part local, lists of *Lepidoptera*, few or none of *Coleoptera*,

and I believe absolutely none of *Hemiptera* or *Homoptera*. One might suppose from its geographical position, the mildness of the climate, the very considerable extent of area, and the abundance of wild country, where everything natural is not improved off the face of the earth by bricks and mortar or cultivation, that the number of species would be great; and that, especially on the west coast open to the Atlantic, the collector might hope to gratify his ambition for new species. There appears, however, to be a general consent that this is not the case. I am not acquainted with many details from purely Irish entomologists; but the Englishmen who have worked in Ireland have almost invariably been disappointed, and have pronounced the country barren as to new or rare *Coleoptera* from Belfast to Killarney, and from Dublin to Connemara. Such was the report of Professor Babington, long ago, and recently of Messrs. Wollaston, S. Stevens, Champion, &c. They did not attack the *Hemiptera* or *Homoptera*. I am, however, strongly inclined to think that a good deal of this depends on the paucity of the observers, the short time devoted to the excursions, and the limited localities examined. I suspect that if Ireland were to be worked as thoroughly as the sister country, it would not be found so woefully deficient.

On two occasions I have spent about a fortnight in the month of August with some friends in the neighbourhood of Waterford, at a village called Rathkurby, from whence I made excursions to the Cummeragh Hills, Thomas Town, the banks of the Suir, Tramore on the coast, &c.; and on one of these visits, more especially, I amused myself with taking type specimens of *every* species of coleopterous and hemipterous insect I could find, whether common or rare; and the result is the accompanying list of three hundred and thirty-five species of *Coleoptera*, and sixty-four of *Hemiptera*; which I think is not to be despised, as the produce not of a set entomological expedition, but of the leisure hours of a visit to friends. I have supplemented the list by a few additional insects, which I afterwards obtained on a visit to Dublin, where, however, I was scarcely able to collect at all, though I did try the Hill of Howth, the Dublin hills, the Sugar Loaf, and got as far as Ovoca. These I have distinguished by the affix of (D). The list is regularly arranged according to Dr. Sharp's catalogue. It will be seen that of *new* species I got none, and that the rare species were not very many; but yet not so much amiss considering the

shortness of the time, and the unfavourable period of the year. Some few of them I had not taken before; so that I was well satisfied on the whole.

The absolute number of specimens I caught was very great; there was no deficiency of insect life. Some of the species which I find rare in England were abundant, as *Apion Gyllenhalli*, *Stilicus similis*, *Homalium Allardi*, *Claviger*, *Phyllotreta sinuata*, *Crepidodera ventralis*, *Aphodius porcus*, &c; *Sitones cinerascens* and *Lema Erichsoni* were not uncommon; but many of our most common insects were entirely absent, such as *Cœliodes didymus*, *Ceuthorynchus pollinarius*, *Meligethes rufipes*, *Aphodius rufipes* and *luridus*; of the genus *Onthophagus* there was not one. Every specimen I saw of *Silpha* was unmistakably *subrotundata*; and *Tachyporus obsoletus* was entirely replaced by what is said to be the var. *nitidicollis*. I did not see one specimen of the ordinary type. The *Hemiptera*, with the exception of a few species, were by no means numerous; and amongst them there was not one new or uncommon. The *Homoptera* at that time I knew little or nothing about; but they were not numerous, and the species were few.

IRISH COLEOPTERA.

<i>Nebria brevicollis</i> , F.	<i>Bembidium decorum</i> , Pz. (D.)
<i>Demetrias atricapillus</i> , L.	" <i>tibiale</i> , Duft. (D.)
<i>Dromius linearis</i> , Ol.	<i>Haliphus obliquus</i> , F.
" <i>nigriventris</i> , Th.	<i>Brychius elevatus</i> , Pz.
" <i>melanocephalus</i> , Dj.	<i>Hydroporus picipes</i> , F.
<i>Calathus melanocephalus</i> , L.	" <i>rivalis</i> Gyll.
<i>Olisthopus rotundatus</i> , Pk.	" <i>Gyllenhalli</i> , Schisot.
<i>Taphria nivalis</i> , Pz.	" <i>planus</i> , F.
<i>Pterostichus cupreus</i> , L.	" <i>pubescens</i> , Gyll.
" <i>madidus</i> , F.	" <i>12-pustulatus</i> , Fab.
" <i>lepidus</i> , F.	" <i>depressus</i> , F.
<i>Amara spinipes</i> , L.	" <i>vittula</i> , Er.
" <i>familiaris</i> , Duft.	" <i>palustris</i> , L.
" <i>ovata</i> , F.	<i>Colymbetes bistratus</i> , Berg.
<i>Harpalus punctatulus</i> , Duft. (D.)	<i>Ilybius angustior</i> , Gyll.
" <i>puncticollis</i> , Pk.	<i>Limnolius truncatellus</i> , Thunb.
" <i>ruficornis</i> , F.	" <i>nitidus</i> , Marsh.
" <i>proteus</i> , Pk. (D.)	<i>Helophorus nubilus</i> , F.
<i>Bradyellus harpadinus</i> , Dj.	" <i>seneciipennis</i> , Thoma.
<i>Trochus minutus</i> , F.	" <i>griseus</i> , Herbst.
<i>Bembidium obtusum</i> , Sturm.	<i>Hydrena riparia</i> , Kug.
" <i>lambros</i> , Hbst.	" <i>nigrita</i> , Germ.

- Sphæridium scarabæoides*, L.
Cercyon obsoletus, *Gyll.*
 hæmorrhoidalis, *F.*
 flavipes, *F.*
 lateralis, *Marsh.*
 unipunctatus, L.
 melanocephalus, L.
 pygmæus, *Ill.*
Megasternum boletophagum, *Msh.*
Cryptopleurum atomarium, *F.*
Allocharya fuscipes, *F.*
 mœsta, *Grav.*
 grisea, *Kr.* (D.)
 algarum, *Fauv.* (D.)
 obscura, *Gr.* (D.)
 lanuginosa, *Gr.*
 bipunctata, *Ol.*
 nitida, *Gr.*
 morion, *Gr.*
Myrmedonia limbata, *Pk.*
 canaliculata, *F.*
Homalota graminicola, *Gr.*
 monticola, *Th.*
 analis, *Gr.*
 aquatica, *Th.*
 trinitata, *Kr.*
 fungicola, *Th.*
 divisa, *Mark.*
 ravilla, *Er.*
 nigra, *Kr.*
 longicornis, *Gr.*
 villosula, *Kr.*
 parva, *Sahl.*
 aterrima, *Gr.*
 muscorum, *Bris.*
 fusca, *Sahl.*
 fungi, *Gr.*
 atramentaria, *Gryll.*
Oligota inflata, *Mann.*
Encephalus complicans, *Ste.* (D.)
Hypocephalus longicornis, *Pk.*
Conurus lividus, *Er.*
Tachyporus nitidicollis, *Step.*
 solutus, *Er.*
 chrysomelinus, L.
 brunneus, L.
Tachinus marginellus, *F.*
 rufipes, *De G.*
- Quedius fulgidus*, *Gr.*
 tristis, *Gr.* (D.)
 brevicornis, *Th.*
 rufipes, *Gr.*
 semimæneus, *Steph.*
 boops, *Gr.*
Ocypus olens, *Mull.*
Philonthus splendens, *F.*
 intermedius, *Boisd.*
 succicola, *Th.*
 addendus, *Sharp.*
 politus, *Fab.*
 marginatus, *F.*
 varius, *Gyll.*
 fimetarius, *Gr.*
 cephalotes, *Gr.*
 fucicola, *Curt.* (D.)
 varians, *Pk.*
 trossulus, *Nord.*
Xantholinus glabratus, *Gr.*
 punctulatus, *Pk.*
 linearis, *Ol.*
Othius læviusculus, *Steph.*
 melanocephalus, *Gr.*
Lathrobium filiforme, *Gr.*
Stilicus similis, *Er.*
 affinis, *Er.*
Lithocharis melanocephala, *F.*
Sunius angustatus, *Pk.*
Stenus pusillus, *Steph.*
 speculator, *Lac.*
 unicolor, *Er.*
 bifoveolatus, *Gyll.*
 rusticus, *Er.*
 ossium, *W. C.*
 impressus, *Germ.*
 annulatus, *Crotch.*
 filum, *Er.*
 occulatus, *Gr.*
 paganus, *Er.*
Platystethus cornutus, *Gr.*
Oxytelus rugosus, *F.*
 laqueatus, *Marsh.*
 sculpturatus, *Gr.*
 nitidulus, *Gr.*
 depressus, *Gr.*
Trogophlæus Erichsoni, *Sharp.*
Homalium riparium, *Th.*

- Homalium Allardi, Fair.*
 " *fossulatum, Er.*
 " *cæsum, Er.*
 " *deplanatum, Gyll.*
 " *concinnum, Marsh.*
Phloeobium clypeatum, Mull.
Claviger foveolatus, Mull.
Scaphisoma agaricinum, Ol. (D.)
Orthoperus atomus, Gyll.
Sericoderus cateralis, Gyll.
Calyptomerus dubius, Marsh.
Anistoma calcarata, Er.
Colon dentipes, Sahl. (D.)
Choleva tristis, Pz.
 " *grandicollis, Er.*
 " *longula, Kell.*
 " *Watsoni, Spence.*
Necrophorus humator, F.
 " *ruspator, Er.*
 " *vespillo, L.*
Silpha subrotundata, Leach. (D.)
Hister carbonarius, E. H.
Onthophilus striatus, F.
Olibrus æneus, F.
Cercus rufilabris, Latr.
Epuræa æstiva, L.
 " *melina, Er.*
 " *florea, Er.*
Meligethes æneus, F.
 " *viridescens, F.*
 " *picipes, Sturm.*
 " *erythropus, Gyll.*
Antherophagus pallens, Ol. (D.)
Cryptophagus lycopodi, Herbst.
 " *pilosus, Gyll.*
 " *scanicus, L.*
 " *dentatus, Herbst.*
 " *bicolor, Sturm.*
 " *vinii, Pz.*
Atomaria fuscipes, Gyll.
 " *atricapilla, Steph.*
 " *fuscata, Schön.*
 " *munda, Er.*
 " *apicalis, Er.*
 " *ruficornis, Marsh.*
Ephestemus pyrinoides, Marsh.
 " *globulus, Pk.*
Monotoma picipes, Pk.
Lathridius transversus, Ol.
- Lathridius minutus, L.*
 " *nodifer, Westw.*
Corticaria punctulata, Marsh.
 " *elongata, Gyll.*
 " *gibbosa, Pk.*
 " *fuscula, Gyll.*
Mycetia hirta, Marsh.
Typhæa fumata, L.
Elmis Volkmar, Pz.
 " *parallelopedus, Mull.*
Limnius tuberculatus, Mull.
Aphodius erraticus, L.
 " *fimetarius, L.*
 " *porcus, F.*
 " *rufipes, L.*
 " *contaminatus, Hbst.*
 " *merdarius, F.*
 " *depressus, Kug., var. nig.*
Geotrupes stercorarius, L.
 " *putridarius, Er.*
Serica brunnea, L.
Helodes minutus, L. (D.)
Anobium striatum, Ol.
Ochina hederæ, Mull.
Cis boleti, Scop.
Octotemnus glabriculus, Gyll.
Salpingus ater, Pk. (D.)
Lagria hirta, L.
Otiorynchus scabrosus, Marsh.
 " *ligneus, Ol.*
 " *picipes, F.*
 " *sulcatus, F.*
Trachyphloeus scaber, L.
 " *squamulatus, Ol.*
Liophloeus nubilus, F.
Barynotus obscurus, F.
Strophosomus coryli, F.
 " *retusus, Marsh.*
Sitones flavescens, Marsh.
 " *sulcifrons, Thum.*
 " *tibialis, Herbst.*
 " *Waterhousei, Walt.*
 " *cinereus, F.*
 " *regensteiniensis, Hbst.*
 " *puncticollis, Steph.*
 " *lineatus, L.*
 " *hispidulus, F.*
Polydrosus pterygomalis, Sch.
Seiaphilus muricatus, F.

- Liosomus ovatulus*, *Clair.*
Hypera nigrirostris, *F.*
 " *variabilis*, *Herbst.*
Hylobius abietis, *L.*
Mecinus pyrastrer, *Hbst.*
Anthonomus rubi, *Hbst.*
 " *comari*, *Crotch.*
Orchestes quercus, *L.*
 " *alni*, *L.*
 " *fagi*, *L.*
Rhamphus flavicornis, *Clair.*
Tychius picirostris, *F.*
Nanophyes Lythri, *F.*
Ceuthorynchus assimilis, *Pk.*
 " *erysimi*, *F.*
 " *constrictus*, *Msh.*
 " *ericæ*, *Gyll.*
 " *litura*, *F.*
 " *quadridens*, *Pz.*
 " *sulcicollis*, *Gyll.*
Ceuthorynchideus troglodytes, *F.*
Phytobius 4-tuberculatus, *F. (D.)*
Rhinoncus pericarpus, *F.*
Apion subulatum, *Kirb.*
 " *carduorum*, *Kirb.*
 " *striatum*, *Kirb.*
 " *seniculum*, *Kirb.*
 " *vicinæ*, *Pk.*
 " *fagi*, *L.*
 " *flavipes*, *F.*
 " *virens*, *Hbst.*
 " *Gyllenhalli*, *Kirb.*
 " *ervi*, *Kirb.*
 " *pisi*, *F.*
 " *æthiops*, *Hbst.*
 " *loti*, *Kirb.*
 " *vorax*, *Hbst.*
 " *miniaturum*, *Germ.*
 " *cruentatum*, *Walt.*
 " *frumentarium*, *L.*
 " *violaceum*, *Kirb.*
Bruchus seminarius, *L.*
 " *ater*, *Marsh.*
Pogonocherus pilosus, *F. (D.)*
Lema cyanella, *F.*
 " *Erichsoni*, *Suf.*
Lamprosoma concolor, *Strm. (D.)*
Chrysomela Banksi, *F. (D.)*
 " *staphylæa*, *L.*
Chrysomela polita, *L.*
Phædon tumidulum, *Kirb.*
Adimonia sanguinea, *F.*
Galeruca lineola, *F.*
Haltica longicollis, *All.*
 " *ericeti*, *All.*
 " *pusilla*, *Duft.*
Crepidodera transversa, *Marsh.*
 " *ferruginea*, *Scop.*
 " *ventralis*, *Ill.*
Aphthona hilaris, *Steph.*
Phyllotreta lepidii, *E. H.*
 " *atra*, *Pk.*
 " *undulata*, *Kuts.*
 " *nemorum*, *L.*
 " *sinuata*, *Steph.*
Plectroscelis concinna, *Marsh.*
 " *aridella*, *Pk.*
Thyamis parvula, *Pk.*
 " *holsatica*, *L.*
 " *brunnea*, *Duft.*
 " *lurida*, *Scop.*
 " *atricilla*, *Gyll.*
 " *melanocephalus*, *Gyll.*
 " *pusilla*, *Gyll.*
 " *tabida*, *Pz.*
 " *gracilis*, *Kuts.*
 " *lævis*, *Luft.*
Psylliodes dulcamaræ, *E. H.*
 " *chrysocephala*, *F.*
 " *var. nigricollis*, *Marsh.*
 " *cupronitens*, *Forst.*
 " *attenuata*, *E. H.*
 " *affinis*, *Pk.*
Sphæroderma testacea, *F.*
 " *cardui*, *Gyll.*
Cassida viridis, *L.*
 " *obsoleta*, *Ill.*
Coccinella 7-punctata, *L.*
 " *hieroglyphica*, *L.*
 " *variabilis*, *Ill.*
 " *ocellata*, *L.*
 " *14-guttata*, *L.*
 " *14-punctata*, *L.*
 " *22-punctata*, *L.*
Scymnus Mulsanti, *Wat.*
 " *limbatus*, *Steph.*
Rhizobius litura, *F.*

IRISH HEMIPTERA.

<i>Pentatoma baccharum</i> , L.	<i>Tinicephalus obsoletus</i> , D. & S.
" <i>viridissima</i> , Pod.	<i>Plagiognathus viridulus</i> , Fall.
<i>Rhacognathus punctatus</i> , L.	" <i>arbustorum</i> , F.
<i>Picromerus bidens</i> , L. (D.)	<i>Psallus salicellus</i> , Mey.
<i>Tropidocoris rufipes</i> , L. (D.)	" <i>lepidus</i> , Fieb.
<i>Piestodorus lituratus</i> , F.	<i>Orthocephalus saltator</i> , Hahn.
<i>Drymus sylvaticus</i> , F.	<i>Heterocordylus tibialis</i> , Hn. (D.)
<i>Stygnocoris rusticus</i> , Fall.	<i>Heterotoma merioptera</i> , Scop.
" <i>sabulosus</i> , Schill.	<i>Rhopalotomus ater</i> , L. (D.)
" <i>arenarius</i> , Hahn.	<i>Capsus capillaris</i> , F. (D.)
<i>Nysius thymi</i> , Wolff. (D.)	<i>Charagochilus Gyllenhalii</i> , Fal.
<i>Monanthia cardui</i> , L.	<i>Liocoris tripustulatus</i> , Fall. (D.)
<i>Orthostira cervina</i> , Germ.	<i>Orthops Kalmi</i> , L.
" <i>obscura</i> , Schaff.	" <i>cervinus</i> , Schaff.
<i>Miris holsatus</i> , F.	" <i>pastinacæ</i> , Fall.
" <i>laevigatus</i> , L.	<i>Lygus pabulinus</i> , L.
" <i>calcaratus</i> , Fall.	" <i>campestris</i> , L.
" <i>ruficornis</i> , Fall.	<i>Zygonotus elegantulus</i> , Ban.
<i>Phytocoris dimidiatus</i> , D. & S.	<i>Tetraphleps vittatus</i> , Fieb.
" <i>floralis</i> , F.	<i>Temnostethus pusillus</i> , Schaff.
" <i>ulmi</i> , L.	<i>Anthocoris nemorum</i> , L.
<i>Dereocoris bipunctatus</i> , Scop.	" <i>nemoralis</i> , F.
" <i>sexguttatus</i> , F. (D.)	<i>Lytocoris campestris</i> , F.
" <i>binotatus</i> , F.	<i>Salda saltatoria</i> , L.
<i>Litosome viridinervis</i> , Kirsch.	" <i>scotica</i> , Curt. (D.)
" <i>concolor</i> , Kirsch.	<i>Plœaria vagabunda</i> , L.
<i>Aeterhinus angulatus</i> , Fall.	<i>Nabis apterus</i> , F.
<i>Sphyrops ambulans</i> , Fall.	" <i>limbatus</i> , Dahlb.
<i>Byrsoptera rufifrons</i> , Fall. (D.)	" <i>flavomarginatus</i> , Scholtz.
<i>Globiceps flavomaculatus</i> , F.	" <i>ericetorum</i> , Scholtz.
<i>Campyloneura virgula</i> , Schaff.	<i>Corixa nigrolineata</i> , Fieb.

52, Burton Crescent, November 13, 1877.

ENTOMOLOGICAL RAMBLES, 1877.

By J. B. HODGKINSON.

I PURPOSE briefly to note captures and journeys made to various districts, and will begin with my first visit to Witherslack, about the middle of March, expecting to find *Butalis incongruella*, and a lot of other hibernated species. Although the weather was tolerably fine there was little or no sunshine; and the only insect that ventured to fly was one *Gracilaria phasianipennella*, the only one I saw this season.

My friend Mr. Threlfall was with me, and he only met with one. We were evidently too early for all the *Micropteryx*, so turned to finding *Elachista* larvæ, but with little success. During the whole of the month of April there was little or no sun, so there was an entire void of all the species I had met with in former years. May came in, and now some of the early April species appeared, such as *Lobophora polycommata*, very fine, on May 12th, at Witherslack; the usual time is April 12th. The hibernating *Depressaria* began to creep out in the middle of May, and two *Capreolella* crept up whilst I was boxing *Elachista subnigrella*; and at Witherslack *Micropteryx salopiella* only began to appear about May 20th, as well as *Incurvaria Zinckenella*. I was afraid that as all the birches that *M. salopiella* was on had been cleared away during the winter I should find none of that species; but there were some little bushes sheltered from the wind, which never ceased to blow; and as I stood beside them patiently, they came popping up as if by magic during the gleams of sunshine, so I netted over thirty specimens. Whilst standing motionless I heard something hissing for some time, but was too intent on *M. salopiella* to pay attention to the cause. At last the reptile, probably tired of my presence, began to crawl off, when I despatched it with my stick. I then went round the bush, and there was another fine viper, which was really a pretty sight: the fore part of the body was raised in a straight line, about two inches off the ground, with its eyes looking at me to see if I was going to pass on; it was motionless to escape detection, and the peculiar position made it look more like a piece of lichen-coloured fir-stick than a snake; however the same fate befel it as the other. The weather was bitterly cold for larva hunting. *Sciaphila Penziana*, *Crambus geniculellus*, and a good many *Satyrus Semele* larvæ turned up among the roots of the grass on the rocks; off the birch came fine larvæ of the butterfly emerald (*Geometra papilionaria*), but they stick hard and fast. On the heath we swept some hundreds of cases of *Coleophora pyrrhulipennella*, not one in a dozen of which, however, may be expected to breed up. *Catoptria aspidiscana*, like other things, was not as common as usual, but it was hard to judge; some odd corners seemed to yield well. All the butterflies, *Nemeobius Lucina*, *Lycæna Argiolus*, *Thanaos Tages*, &c., were very scarce; *Leucophasia Sinapis* I saw laying its eggs, as usual, on the *Lotus corniculatus*, in the woods at Grange. Sticking on the rocks, at Witherslack, we found scores of cases of

Solenobia triquetrella; not a single male came out; nothing but apterous females. On the heaths scarcely a living insect; even the hawking *Diptera*, *Empis borealis*, was either like what it likes to kill—*nil*, or it was not worth turning out to look for food; and the species was fully a month late in appearing. There were no emeralds, and only very few *Geometra* larvæ; *A. strigillaria* was the chief one. May passed away without much being done. I had been to Windermere during the month several times, and there was little or nothing to be seen; the only insects I got on May 28th were *M. salopiella*, *I. Zinckenella*, and one *I. tenuicornella*. This is a new locality for these species; and the place where I took them is in a wood close to Windermere Station. I may note now for June, whilst I am on this locality, that *Micropteryx Mansuetella* was very scarce. The only species tolerably common was *M. Allionella* among the honeysuckle, and *Capua ochraceana* was pretty plentiful; but it was really dejecting to see no life around. Scarcely a wood wren to utter its plaintive and tremulous note. As to beating, a chip-axe (*Eurymene dolobraria*) tumbled down like a dead leaf; and an odd *Cidaria corylata*, and now and then an *Argynnis Euphrosyne* was to be seen; so off I set to look for the field where Allis and I used to take *Coleophora deauratella*. Here another blank: the nice stream that ran through the fields had been drained off, and it was now a potato field; another locality gone. Now into the woods again for larvæ of *Argyresthia Andereggiella*: they, like other things, were a poor crop, and still worse to breed. Two or three more visits yielded little worth note; only *Tinagma resplendella*, *Eupithecia plumbeolata* among the *Melampyrum*, and on the birch I took *Coleophora Wilkinsonella* and *Cryptoblabes bistrigella*, and an odd specimen each of *Phoropteryx diminutana* and *Stigmonota puncticostana*. I must close June, so far as Windermere is concerned, and go back to another region.

Early in June Mr. Threlfall and I paid a visit to Heysham, below Morecombe, to look for larvæ; but the wind blew a gale, and on the high exposed cliffs we had to lie down to shelter the plants we were examining, and then the cold was miserable. On *Genista tinctoria* we got a lot of larvæ of *Anarsia genistella*: from specimens bred we conclude they are identical with *A. spartiella*; they are darker than *A. spartiella*, which we attribute to the plant being more succulent than the common broom. The *Depressaria*

costosella larvæ on the same plant produced much handsomer moths than those of the common whin or furze. Our next try was to find the larva of *Spilonota amœnana* (*incarnatana*) on the *Rosa spinosissima*: we saw our old friend *Dictyopteryx Bergmanniana*, which we recognised, and made out that we had three species of *Tortrix* larvæ; the other two species produced one only of *S. amœnana*, and several *S. roborana*. Our elbows being sore with lying on them, and our eyes full of sand, and being starved into the bargain (this in June), in order to stretch ourselves we went among the rocks to birds'-nest: rock pipits and rock doves were there; but this game was soon up, when we saw great patches of *Cochlearia* hanging down in masses, and I told my energetic friend this was the spot where I took some years ago the handsome Irish form of *Plutella annulatella*. He was not long before he was up and throwing the plant down to me; but some of the loose soft freestone giving way gave him a hint to be cautious. We filled our bags and nets, too, with the plant. In the meantime I tumbled one-half of mine away, expecting to find the larva of *Gelechia leucomelanella* to fill its place; but no such luck; it would have been better to leave the plant on the chance of *P. annulatella*. But here is another mystery: I beat over and over again the plants I had thrown out on to a bare rock, and not a larva could be seen, nor yet any traces of the seed being eaten. However, I tumbled the remaining plants on to a newspaper in my breeding-room; and next day there were several fine full-fed larvæ. They changed well on the paper, and I bred over a score. The larvæ must have been buried over head in the seed-pods. This was the only journey to Morecombe.

Now we will pay a visit to Humphrey Head, a bold promontory right opposite, about eleven miles across. During the last week in June, the wind blowing as usual, we kept waiting for fine weather, which never came. We had a resolve always ready that we would go in spite of wind or weather. At last it was dry for a few days, so off we set to look for *Coleophora salinella* on a salt marsh, where I took such a lot some years ago. We had to crawl on our hands and knees, parting the grass to get as many as we did, *viz.* about thirty each: this was two days' work. On the Saturday night we went on the rocks, hoping to take *Barrettii*; but no such luck: we were starved off, and only got *Eupithecia constrictata*, *Ligdia adustata*, *Sericoris littorana*, and such like,—a miserable catch for the misery in store for us. We

thought that a mile might be saved by going over hedge and ditch: the hedges we either got over or through, but the ditches mastered us; they were too wide to jump, and too wet to get near enough to try. After walking through hay-fields and cornfields to get to a bridge we were thoroughly knocked up; and darkness setting in, and not knowing the district, we were heartily glad to see a light and hear a dog bark, and to get into Flookburgh again. The people at the inn had given us up for the night. There was another unpleasant look out: the fields there are half a mile across, and not a few bulls about; their company was certainly not desired by us in the darkness, when we could not see where the hedges were.

Here for the first time on the marshes *Colias Edusa* was to be seen: one female was sitting quietly on a plant of *Lotus corniculatus*, no doubt laying its eggs; now and again it kept walking round, as I have often noticed butterflies, as though wanting to be quite sure it was the right plant to lay on. *Leucophasia Sinapis* (the wood-white) over and over again settles on various plants, but does not attempt to lay on any other but the *Lotus*; it seems to be quite engrossed in its examination. Is it sight or smell that dictates its judgment, if I may so call it?

(To be continued.)

ON THE DEVELOPMENT OF GALLS OF CECIDOMYIA ULMARIÆ.

By E. A. ORMEROD.

THE cecidomyiaceous galls affecting both sides of the leaf of the common meadow sweet (*Spiræa ulmaria*) are well known as they appear on the upper surface, simply as a somewhat spherical or globose enlargement of the leaf tissues, corrugated by a minute network of veins, the colour varying from white to deep pink, and the surface glabrous. Beneath the leaf, however, their structure is very different, being composed, when fully developed, of two filmy growths of tissue, joined or closely applied by their edges, forming together a kind of funnel-shaped or inversely pear-shaped involucre to the true gall or larval chamber within, and the gradual change of form in the progress of development (which, as far as I am aware, has not yet been described) is of some interest.

About the 30th of October, 1877, when these galls were exceedingly plentiful by one of the streams in the neighbourhood of Isleworth, my attention was attracted by the great variety of shape on the part of the gall-growths beneath the leaves, some (apparently still in their earliest stages) being simply like a white blister, or semi-globose protuberance,



Development of galls showing—1. First stage. 2. Further development, with funnel-shaped extremity. 3. Fully developed gall. 4. The same, in section. 5. Gall spread open after exit of the larva.

beset with white silky hairs (fig. 1); others globose and prolonged to a funnel-shaped extremity (fig. 2); whilst other fully-grown specimens had the funnel-shaped extremity broader and more developed, or open for the exit of the gall-gnat larva.

On carefully examining the gall in its first stage by pressing the side of a fine needle across the convex top, it would be found there was a narrow strap-like process (the future funnel-shaped extremity) folded flatly down on it, in the same way as the tip of a glove can be laid on the contained finger. As growth proceeded this folded extremity altered its position to the complete funnel-shape given at fig. 2, the long blunt point being divided into two parts by a slit on each side, running about a third of the length of the gall and gradually widening, till at the time for the evolution of the larva the outer husk of the gall was merely a globose case, tubular below, of two somewhat leaf-like portions of filmy tissue, closely applied by their edges and guarding the true gall, much as the young filbert is guarded in the long projecting husk, and varying from the portion exposed on the upper side of the leaf in being usually white, and thickly beset with white hairs.

The inner or true gall is similarly globose, and somewhat pointed, usually single-celled, of thin tissue, more succulent towards its base, and white; flocculent outside, but of perfect

smoothness within, and though not always perfectly separated down to the base from its outer husk, yet quite clearly so in some cases, as given in section at fig. 4, which shows the blunt-pointed extremity a little drawn open, as for the exit of the larval tenant.

After exclusion has taken place the gall may be found as at fig. 5, completely expanded, with the two involucreal films thrown back, showing the separation complete to the base, and the sometime bluntly-pointed globose gall lying with its extremities curved inward in the centre of its husk with its cavity displayed, much like some cup-shaped flower in its calyx. The galls vary much in size up to about three-sixteenths of an inch in length, and in breadth in the longest diameter.

At the end of October the *Cecidomyia ulmariae*, Bremi, larvæ were leaving the galls; but except in cases of double formation of the gall itself I never observed more than one tenant in each. The operation of freeing itself was very rapidly performed, in the only case I had the opportunity of watching throughout, by the orange-coloured larva pressing itself tail foremost down the funnel of the gall till it was completely outside, then twisting itself head foremost it curled and struggled for some time on the surface of the gall (the long gall-hairs giving it power to keep hold), the only long-continued position being when it placed itself upright on one extremity, as if boring; and on being transferred to some earth it buried itself.

By the 7th of December, although galls were still to be found on the *Spiræa* leaves, all that were opened were tenantless.

Spring Grove, Isleworth, December 11, 1877.

DESCRIPTIONS OF OAK-GALLS.

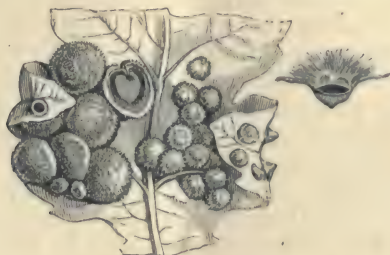
Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from vol. x., p. 299.)

77. *Cecidomyia cerris*, Kollar.—The galls of this gall-gnat may often be found in enormous numbers on the leaves of *Quercus cerris*; they generally appear about the middle of June, sometimes still earlier. The gall appears on the upper side of the leaf as a small conical leaf-swelling of about

1 millimetre in height, and with a horizontal diameter of about 2 millimetres at the base; it is bare and green, but later on it becomes yellow or yellowish brown. At the corresponding spot on the under side of the leaf it appears as



Figs. 77 & 78.—Galls of *Cecidomyia cerris*, and in section; Galls of *Cecidomyia circinans*, and a specimen in horizontal section.

a circular, slightly convex, projecting disk, of about 2 millimetres in diameter: it is very thickly covered with yellow or yellowish brown outstanding, fine, but tolerably long, hairs. In the interior is a larva-chamber, in which the reddish orange maggot lies. When the gall contains the gall-gnat larva, and not a parasite, towards the end of October or beginning of November the fully ripe gall swells, so that this disk opens like the lid of a box, and the maggot falls to the ground, where it winters and changes to a pupa, till in May the perfect gall-gnat is evolved. Should the gall contain the larva of an ichneumon the lid does not open; and in order to release itself the fly bites a round hole through the side of the cone on the upper side of the leaf.—G. L. MAYR.

78. *Cecidomyia circinans*, Gir.—This gall may be found on the under side (rarely on the upper side) of the leaf of *Quercus cerris*, often mixed with the preceding species on the same leaf. It occurs as a circular or kidney-shaped disk, which is about 2 millimetres high, with a horizontal diameter of 5 to 6 millimetres, and is thickly covered with outstanding, yellow or gray, hairs. In the centre of the gall, on the upper side of the leaf, it exhibits an annular, mostly yellow, swelling, with an extreme diameter of from 2 to 2.5 millimetres; within this is a thin, hairy membrane, stretched horizontally, which, when the gall becomes mature, opens in the middle and forms a cavity: this leads to the interior at the axis of the gall, and curving spirally becomes formed into a circular channel, which terminates near the periphery of the orbicular

gall, and contains the maggot. This gall appears at the same time as the preceding, yet the maggot passes the winter in the gall, and leaves it as a fly in April: it leaves the annular swelling on the upper side of the leaf in such a manner that half or more of the white pupa-case is left protruding from the ring. Besides these two cecidomyioid galls I have found several rarer ones on the leaves of the Turkey oak, which are similar in appearance, and probably are also produced by gall-gnats; but I have not as yet obtained the gall-maker.—G. L. MAYR.

Two other species of *Cecidomyia* are known to make galls on *Quercus cerris*. They are both inhabitants of Austria, but the imago is undescribed. The gall of *Cec. ? subulifex*, Mayr, is mentioned by Giraud (V. z. b. G., 1861), Frauenfeld (1870), Mayr (1874), and F. Löw (1874). That of *Cec. ? galeata*, Fld., only by Frauenfeld (V. z. b. G., 1861). All four species, being confined to the Turkey oak, are not likely to occur in Britain. At the 4th October, 1876, meeting of the Vienna Society, Dr. Franz Löw read a paper on gall-gnats, in which he described *Cecidomyia homocera*, n. sp., from leaf-galls of *Quercus cerris*. This paper is not yet printed, so I do not know whether it refers to one of the above mentioned or is a fifth species. Remarks on the parasitism, which is curious, may be deferred, as I hope soon to obtain fresh specimens of the galls. Dr. Mayr has obtained two species of *Cynipidæ* and two species of *Torymidæ* from them.—E. A. FITCH.

NOTES ON NEW AND RARE HYMENOPTERA,
CAPTURED DURING THE YEAR 1877.

By FREDERICK SMITH.

THE past season—as far as my own observation has enabled me to ascertain, and from information derived from others—must be pronounced to have been most unfavourable for the collection of the *Aculeata*. According to my experience of such seasons, they are those in which a few great rarities, or the appearance of particular species in very unusual abundance, may be expected to occur; and the past has been no exception to what is apparently a rule. Some years ago I spent the month of August at Deal; during the entire month scarcely a day passed without rain, and the few days that were free from showers were cold and windy.

The day before leaving one of the best localities for collecting *Aculeata* a fine autumnal day occurred, just the day an entomologist longs for. On that day I took twenty-two specimens of *Andrena Hattorfiana*, the finest species of the genus found in this country. This year I visited the same locality, at the same date in August, where on a splendid day not only did I fail to find *A. Hattorfiana*, but I also failed in finding a single specimen of any species of the genus *Andrena*. My favourite bank, at Kingsdown, was, on that occasion, the resort of hundreds of *Colias Edusa*.

In recording what has come to my knowledge of notable captures, I must mention a new species of ant, *Ponera tarda*, discovered by Mr. R. S. Charsley, in a conservatory, at Oxford; he has subsequently described the species. The rare bee, *Prosopis dilatata*, was taken at Hayling Island, by Mr. Edward Saunders. Some very interesting varieties of species of the genus *Sphecodes* have been met with at Guestling, near Hastings, by the Rev. E. N. Bloomfield: a totally black variety of *S. gibbus* (male), and three similar varieties of *S. ephippius* (male). These are the first I have seen of this small bee. Of *S. gibbus* I took four black males on one occasion, at Lowestoft, some years ago; but the black varieties are of very rare occurrence. At the beginning of July I found the very local *Colletes marginata* at Littlehampton; the somewhat local bee, *Megachile maritima*, was plentiful at the same locality, as well as *M. argentata*.

Of the genus *Halictus* Mr. Edward Saunders has taken two or three apparently new species, belonging to the same division as *H. minutus*; also the *H. pauxillus* of Schenck. Mr. Saunders has also taken a fine series of *Andrena nigriceps*, at Southwold, in the month of August. *Andrena spinigera* has been captured at Guestling, near Hastings, by the Rev. E. N. Bloomfield; but the great discovery, made by the same gentleman, of a genus and species new to Britain, is the capture of the season: the bee is *Rophites quinquespinosus*, a species widely distributed on the Continent. I possess examples from the South of France, Nassau, and the Island of Malta. Only a single female was taken at Guestling, and was no doubt mistaken for a species of the genus *Halictus*, to which it undoubtedly bears a strong resemblance; but *Rophites* has an elongate tongue, only two submarginal cells, and has not the anal rima which distinguishes the females of *Halictus*; the male has the

general aspect of a male *Halictus*, but the spines on the apical ventral segment at once distinguishes it.

Mr. J. B. Bridgman, of Norwich, has this season completed his remarkable captures of *Macropis labiata*, by securing at last the long-looked-for female; males he had taken in 1874, and also in 1876; the other sex had not been previously taken in this country. Some forty, or perhaps fifty, years ago Dr. Leach took a male in Devonshire. This remained an unique British specimen in the British Museum collection, until Mr. J. Walton found another in the New Forest, twenty, or probably nearly thirty, years afterwards. Several years again elapsed, when another male was taken by Mr. S. Stevens, at Weybridge. No other capture of the species occurred, until Mr. Bridgman found it at Brundall, thirty-two years subsequently.

I am not aware of any other capture of new or rare *Aculeata* made during the past season; but when such as I have recorded are the fruits of a general scarcity of *Aculeata*, we may be pardoned if we wish many returns of similar seasons.

27, Richmond Crescent, Barnsbury,
December, 1877.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DESCRIPTION OF THE LARVA OF *ACIDALIA INCANARIA*.—The eggs of this species I received in July, 1875, from Mr. Alfred E. Hudd, of Clifton, Bristol. They were globular, and pale straw-colour. On the 29th of the same month they hatched, and the newly-emerged larvæ were slender, body dark green, the head brown. They fed on *Polygonum aviculare* until autumn, when they hibernated; still feeding a little, however, on withered dandelion leaves, on mild days all winter. The dandelion leaves had been supplied when the knot-grass failed, and was subsequently their food until their full growth. They were spinning up from the middle to towards the end of April. Length about three-quarters of an inch, and of average bulk in proportion. The head has the face flattened, and is notched on the crown. Body tolerably cylindrical, tapering from the 9th segment to the head, which is very small. The segments overlap each other, making the divisions distinct; but there is not the marked difference between the width of the posterior and

anterior of each segment which is characteristic of so many of the species in the genus *Acidalia*. Skin tolerably smooth, but with a tough appearance. The ground colour of the dorsal surface is stone-gray, with very faint pink tinge on the front and posterior segments. Head dirty, smoky brown, with pale stone-coloured streak on each lobe. The medio-dorsal line is pale gray, but very narrow and indistinct; on the 10th to 13th segments it is very broadly edged with smoke-colour; on the other segments this smoke-colour takes the form of a very pretty, but almost indescribable, pattern, having the appearance of a double series of V-shaped marks, or rather a V mark and an X mark, the posterior half of the X, however, being much narrower than the anterior, the V mark being within the anterior of the X mark. There are no other distinct markings, but the sides are much marbled with the dark smoke-colour. The ventral surface seems to have an under-ground of pinkish gray, but is very strongly suffused throughout with pale blue; the sides are thickly dotted and marked with smoky black. Extending the whole length is a series of large pear-shaped marks, one on each segment, and the narrow end of the pear-mark pointing towards the head: these marks are of two colours, a broad central stripe being pale blue, the remainder pinkish, and on the marks is a conspicuous series of black Y-shaped marks; spiracles imperceptible. When at rest the food-plant is grasped by the claspers, and the anterior segments coiled inwards, the head and legs being tucked closely together. The cocoons were formed of a few threads drawn loosely together in the corners of their cage, or amongst withered leaves at the bottom. The pupa is about three-eighths of an inch long, has the thorax rounded, the eyes prominent, and the abdomen tapering sharply to a point. Ground colour dark ochreous-yellow, and the back of each segment neatly marked with four transverse dark brown spots; eye- and wing-cases dull dark green; tip of abdomen very dark brown. A beautiful and strongly-marked series (some almost black) of imagos emerged at the end of June, or in July.—GEO. T. PORRITT; Highroyd House, Huddersfield, December 6, 1877.

LATE APPEARANCE OF *PYRAMEIS CARDUI*.—On the 24th of September last I found a solitary larva of *Pyrameis cardui* feeding on thistle. It fed up slowly, turned to a pupa on the 8th of October, and the butterfly emerged on the 24th of November.—ROSA M. SOTHEY; Sunnyside, Hastings, Sussex.

SPHINX CONVULVULI NEAR LEEDS.—On the 3rd of September a friend brought me a female of this species from Rothwell. It had flown into a brewhouse there.—CHARLES SMETHURST; Leeds, October 23, 1877.

SPHINX CONVULVULI NEAR BRADFORD.—In September last a specimen of *Sphinx convulvuli* was captured by a boy at Heaton, near Bradford. I believe this is the first record from this locality.—J. W. CARTER; Manningham, Bradford, November 16, 1877.

SPHINX LIGUSTRI WITHOUT HIND WINGS.—Last June I bred a specimen of *Sphinx ligustri* with the fore wings quite perfect, but without hind wings, or any trace of their formation.—BERNARD COOPER; Higham Hill, Walthamstow, October 23, 1877.

EUPITHECIA SUBCILIATA, HYPOLEPIA SEQUELLA, AND LITHOCOLLETIS TRIFASCIELLA, BRED.—I had long suspected that the larvæ of the handsome *Hypolepia sequella* fed upon maple, and have now the pleasure of recording the breeding of five specimens from larvæ beaten from that tree in the beginning of June. They are pale green, attenuated at both ends, and possess the remarkable activity characteristic of the larvæ of this group, escaping from the folds of the leaf on the slightest touch. I am now breeding *Lithocolletis trifasciella* from mined leaves of honeysuckle, collected at the end of October. There are two species mining the leaves: *L. trifasciella* and *L. emberizæpennella*, the former twisting the leaf, and the latter causing it to assume a bladder-like appearance. Last year all the *L. trifasciella* I reared emerged in November, the *L. emberizæpennella* remaining in pupa till the following June. I reared fifteen specimens of *Eupithecia subciliata* from larvæ beaten from the flowers of the maple, at the end of May.—W. MACHIN; 22, Argyle Road, Carlton Square, November 28, 1877.

GELECHIA SCRIPTELLA.—From larvæ found feeding between united maple leaves in the early part of September last year, I reared, in June last, about twenty specimens of this pretty species. The larva changes to pupa in a slight silken web in the folds of the leaf, about the end of September.—ID.

OCCURRENCE OF SPILODES PALEALIS AT FYFIELD, ESSEX.—A good specimen of this somewhat local insect flew into a room at Mill Hatch Farm, Fyfield, near Ongar, on the evening of the 12th August, while we were at supper.—ID.

VARIETY OF ANCHOCELIS PISTACINA.—While sugaring near Caterham, on October 6th, I took a fresh specimen of

A. pistacina, which retains the usual markings, but each fore wing is ornamented with a large blotch of a metallic cast near the hind margin, and reaching from the costal to the inner margin. Can anyone account for such a variety; and is it usual?—F. STEWART; New Cross.

CAPTURES NEAR UXBRIDGE.—Among my captures lately have been specimens of the following insects:—*Sphinx convolvuli*, *Nola strigula*, *Liparis dispar*, *Ennomos fuscantaria*, *E. erosaria*, *Selene illustraria*, *Boarmia consortaria*, *Phorodesma bajularia*, *Sterrhia sacraria*, *Apamea fibrosa*, *Xanthia aurago*, *Cirrhædia xerampelina*, &c.

CAPTURES NEAR WINCHESTER.—*Epione advenaria*, *Emmelesia unifasciata*, *Notodonta trepida*, *Apamea ophiogramma*, *Agrotis cinerea*, &c.

CAPTURES NEAR BRIGHTON.—*Sphinx convolvuli*, *Acidalia rusticata*, *Eremobia ochroleuca*, &c.

CAPTURES NEAR EXETER, &c.—*Larentia cæsiata* (on Yes Tor, Dartmoor. Is not this unusual in the South?), *Phibalteryx polygrammata*, *Tethea retusa*, &c.

I believe these are new localities for *S. sacraria*, *C. xerampelina*, *A. fibrosa*, *A. ophiogramma*, *A. rusticata*, *P. polygrammata*, and *L. cæsiata*.—J. E. BENBOW; Grosvenor House, Hillingdon, near Uxbridge, October 24, 1877.

FEMALE MOTHS ATTRACTING MALES.—Attention having been invited to this subject in a past number of the 'Entomologist,' I venture to record a fact which is new to me, and perhaps to others, that *Sphinx ligustri* possesses this power in no small degree. A crippled female having emerged early last June, I placed her upon the curtain in my bedroom: though the window was open all day no males entered before I went to bed at half-past eleven p.m.; but about three o'clock I was aroused by a loud knocking at the window, which is forty feet from the ground. Leaping out of bed I struck a light, and captured no less than ten males in the room, and could see two others on the glass outside. At this time the female was dead, for I had accidentally crushed her between the bars of the Venetian blind early in the evening. Probably the females of other *Sphingidæ* will prove as attractive during the small hours of the morning. I have also known the female of *Bombyx quercus* after death to attract several males. *Pseudopterpna cytisaria* assembles males from about seven to nine p.m.; indeed I have found that it is a good plan to watch the males as they fly among the furze bushes in order to obtain newly-emerged females;

but as they always seem to be in the centre of a thick furze bush the capture necessitates no small amount of agony. *Amphydasis betularia* and *Chelonia villica* also attract males in the dusk of the evening. I have also several times discovered the females of *Hepialus hectus* and *H. sylvinus* by making a diligent search in spots where the males were hovering.—E. K. ROBINSON; St. Leonard's, Oct. 19, 1877.

MACROPIS LABIATA, Panz.—I am indebted to the Rev. J. L. Brown for the first specimen of this insect captured in Norfolk. He industriously collected insects of all orders to make microscopic preparations, and before putting them into spirit very kindly let me look them over and take what I wanted; and it was amongst one of these gatherings I found my first male *Macropis labiata*, taken on the 8th or 10th July, 1874, but where he could not remember, whether at Brundall or Swainsthorpe. I could not find it that year; but next, 1875, I took one male on the creeping thistle at the former locality. In 1876 I took seven more males at the same flower. This present year (1877) I took the first on the 15th of July, and they were to be seen till the middle of August; this year I took the males, not only at the above-mentioned plant, but also at the *Lysimachia*, mint and marsh *Potentilla*. On the 5th of August I took the first British female at the creeping thistle, and on the 14th I took ten more; most of these were more or less imperfect; of these latter two were on the creeping thistle, but not one of these three had any pollen; the others were all at the *Lysimachia*, and had their legs well covered with the pollen, and had evidently drawn their supply from that flower. The insect is a very swift flyer, but not at all active when on the flowers. The locality where they are found is by the side of a boggy marsh, but has much higher ground by the side of it; I am inclined to believe they burrow into a dry-ditch bank. I am greatly indebted to Mr. F. Smith for advice as to where to look for the missing female. Should any hymenopterists have a vacant place in their collection, I have a few duplicates left, which I shall be happy to distribute as far as they will go.—JOHN B. BRIDGMAN; Norwich.

COLEOPTERA-HUNTING IN 1877.—During the past year my *Coleoptera*-hunting has been very successful, although I have not devoted very much time to it. In the early part of June, in beating the blossoms of the hawthorn, I took a specimen of *Orsodaena nigriceps*, about a mile from Oxford, and although I sought diligently I did not see another example. In

November (I forget the exact date) I took, in an old sand martin's nest on the side of Shotover Hill, near Oxford, a single specimen of the curious and very rare little *Leptinus testaceus*, a remarkable locality, I believe, for the insect. Both of these specimens Professor Westwood kindly assisted me to identify. I took also single specimens of *Rhagium bifasciatum* (dead, and much injured) and *Ochina hederæ*, at Bishopstone, near Hereford; *Cillenum laterale*, under a stone, at Aber, and *Cryptolithus riparius* on the top of Moel Union, in North Wales. I found a number of the larvæ, imagos, and one pupa, of *Melanotus castanipes*, in a decaying fir tree, at Bishopstone, in September.—HENRY N. RIDLEY; 46, Holywell, Oxford, December 13, 1877.

MOULD ON INSECTS.—In Greene's invaluable 'Insect Hunter's Companion,' on the subject of mould, I find the following:—"Every insect ought to be touched with a weak solution of bichloride of mercury in alcohol. . . . I believe insects never get mouldy when this is done." But supposing insects, as mine, *have not* been touched, and *have* got mouldy, will this cure them? If not, what will? I should be very much obliged for any information which would help me to get rid of "this, the worst enemy the collector has to deal with."—G. R. DAWSON; Poundsworth, Driffild, December 3, 1877.

[The best preventative known against mould on cabinet specimens of insects is glacial carbolic acid. This may be obtained in small bottles from any chemist. The readiest way of applying it is to place the bottle, having first removed the stopper, in a cup of hot water, which thaws the frozen acid. Then have a little piece of cotton-wool, about the size of a pea, placed on the head of a small pin: this must be soaked in the warm fluid acid. As soon as exposed to the air, in ordinary temperature, the acid on the wool hardens, and then the pin may be stuck in the cabinet drawer: two of these pieces of cotton-wool, so soaked, in each drawer, will deter any further spread of the microscopic fungus, called mould. All specimens already attacked with this fungus may be cleaned with the preparation of alcohol above mentioned. But the greatest preventative of all is to keep the cabinet or store-boxes in a dry room. We may also note that, in answer to an enquiry, Mr. G. R. Crotch gave the following method in the third volume of the 'Entomologist,' p. 72:—"The best way of removing mould from the wings is to dry the insect thoroughly before the fire, and brush it off with a camel's-

hair brush. From the antennæ it can be removed by the above application (one part of carbolic acid to ten of benzine), which might with advantage be applied to the under surface of the body. A slightly stronger solution, brushed over the corners of the drawer and the glass frames, would probably check any further development of mould, as also of mites." The enquirer, Mr. F. Wilkinson, tried this plan, and found it successful.—Ed.]

HAGGERSTON ENTOMOLOGICAL SOCIETY.—The Annual Exhibition of this Society was held at their rooms, 10, Brownlow Street, Dalston, on the evenings of Thursday and Friday, 8th and 9th November. The walls were tastefully decorated with preserved fish, birds, &c. The principal exhibitions were as follows:—Mr. C. A. Briggs exhibited a fine variety of *Satyrus Janira*, taken at Folkestone. Mr. Eedle, *Heliothis armigera*, a dark brown variety; *H. peltigera*, very light; *Camptogramma fluviala*, *Anticlea sinuata*, and a case containing preserved larvæ, including *Stauropus fagi*. Mr. Cooke, some fine exotic *Lepidoptera*. Mr. Lane, *Colias Edusa* var. *Helice*, a nicely marked specimen. Mr. Whale, *D. albi-macula*; *Heliothis armigera*, taken at Shirley; *Epunda lufulenta*; and a striking variety of *Mania maura*. Mr. Hackett, *Apamea ophiogramma*, *Apatura Iris*, and *Ennomos erosaria*. Mr. Cooper, *Macaria alternata*, *Cleora glabraria*, and *Lobophora sexualisata*. Mr. Macqueen, a case containing fifty species illustrating the *Lepidoptera* of our London gardens. Mr. Oldham, *Cymatophora ocularis* and *L. albipuncta*. Mr. Pratt, *Xylomiges conspicillaris*, *Cucullia gnaphalii*, *Eupithecia expallidata*, and a variety of *Pyrameis cardui* with the hind wings smoky. Mr. Meek, fine series of *D. albi-macula* and *Meliana flammea*. Mr. Purdey, *Deiopeia pulchella*, and a variety of *Acronycta tridens* with a banded margin. Mr. Bryant, *Noctua ditrapezium*, *Cidaria sagittata*, *Eupithecia togata*, *Macaria alternata*, and *Anticlea sinuata*. Mr. Harper, varieties of *Liparis monacha* and *Limenitis sibylla*. Mr. Elisha, some fine series of various species. There were also a great many specimens of *Colias Edusa* exhibited, some of them varying more or less from the ordinary type. Mr. Trew exhibited a nest of wasps (*Vespa vulgaris*), with hibernating females. There was a very good attendance on both evenings; and the exhibition passed off very successfully.

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VARIETY OF *Polyommatus phlæas*.

By WALTER P. WESTON.



POLYOMMATUS PHLÆAS (VARIETY).

THIS beautiful variety of *Polyommatus Phlæas*, in which the usual spots in the fore wings are replaced by a broad black band extending entirely across the wings, was taken by Mr. A. Marriott, on the 7th of August, 1876, when flying along a piece of waste ground in the neighbourhood of Finchley, Middlesex. The lower wings are marked as usual, and the markings on the under side are entirely normal, without showing the slightest trace of the black band so conspicuous on the upper side. Mr. Marriott informs me that even when on the wing this black band was very perceptible, giving the insect a darker and totally different appearance to the type. My thanks are due to Mr. Marriott for his kindness in allowing me the loan of this insect for the purpose of figuring in the 'Entomologist.'

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in National Museum of Science and Art for Ireland.

No. VI. NYMPHALIDÆ—BRASSOLINÆ.

THE most constant character of the *Brassolinæ* is the presence of a small prediscoidal cell on the hind wings, and the discoidal cell itself is perfectly closed. Nearly all the

species have two large eyes on the under side of the hind wings, one on the middle of the costa and the other near the anal angle. The larvæ have generally bifid tails, and are without spines. This subfamily is exclusively Tropical American, and, along with the *Morphinæ*, includes the largest of the American butterflies. They are robust insects, and generally fly at twilight.

The genus *Brassolis* (which was formerly placed alone in the family *Brassolidæ*, the remaining genera being referred to the *Morphidæ*) may be distinguished by its very small palpi; and the larvæ are destitute of an anal fork. The thorax and abdomen are very robust, and the antennæ are also thick, with a gradually formed club, so that one of the species has actually been mistaken for a *Castnia*. There are very few species known, all closely resembling the three old species, *Astyra*, Godt., *Sophoræ*, Linn., and *Macrosiris*, Westw. and Hew. The two first are about three inches and a half across, dark brown, with a broad tawny band on the fore wings, bifurcated on the cell, and running from thence to the inner margin. In *B. Astyra* the costa is much more strongly arched than in the other species; and the hind margin is slightly concave. *B. Sophoræ* has a narrower and redder submarginal band on the hind wings also. *B. Macrosiris* is a very heavy-looking, purplish brown insect, with two large round black spots surmounted by a smaller white one near the tip of the fore wings; and the apex of the hind wings, and a short line running from the costa of the hind wings just beyond the cell, are violet.

The genus *Opsiphanes* includes a number of species, much resembling *Brassolis*, but with broader wings and more slender bodies. They are nearly all brown insects, with a band, varying from buff to reddish orange, running from the middle of the costa of the fore wings, where it is often bifurcated, to the hinder angle, and generally a similar submarginal band on the hind wings. In *O. Syme*, Hübn., the band is submarginal on the fore wings also, and there is a shorter one within it; the hind wings of this species are suffused with blue in the male. In *O. Batea*, Hübn., all the wings are tawny to beyond the middle; and *O. Boisduvalii*, Westw. and Hew., is uniform tawny, with a dull brown spot near the tip of the fore wings. *Dynastor Napoleon*, Westw. and Hew., is an immense brown butterfly, with narrower fore wings and thicker body than *Opsiphanes*; it expands about seven inches. There is an interrupted pale yellow band

across the fore wings, and the hind wings are broadly edged with orange; there are also a few orange spots near the tip of the fore wings. This is one of the handsomest and rarest of the Brazilian species. The other known *Dynastor*, *D. Darius*, Fabr., is a much smaller insect, about three inches and a half across the brown fore wings, with dull white spots on the outer half of the fore wings, and a white spot on the costa of the hind wings, from which a dull bluish stripe runs curving half-way to the anal angle.

Penetes Pamphanis, Westw. and Hew., is another fine and rare Brazilian species, with rather long fore wings, concave on the hind margin, and finely spotted with crimson; the hind wings are brown; the under surface is without eyes, being coloured nearly as above.

The genus *Caligo* contains some of the largest of the American butterflies, which may be recognised at once by the huge black eye on the middle of the hind wings beneath, containing a crescent of bluish white scales, and enclosed in a broad yellowish ring; the upper side is velvety black, generally suffused with blue towards the base of at least the hind wings; the fore wings are often buff or dull yellow towards the base, or the bluish portion is bordered with a streak of this colour. In *C. Atreus*, Koll., the fore wings are marked with a brilliant purple band, divided by a pale streak running up from the costa, and diminishing upwards; the hind wings are broadly bordered with orange, edged with black on the upper half. *C. Beltrao*, Ill., has the tip and hind margin of the fore wings bordered with orange, with an irregular black mark just before the tip. The species of *Caligo* measure from about five to seven inches across; those of *Eryphanis*, Boisd., are a little smaller, and the eye of the hind wings is much smaller, more oval, and generally connected with another small spot. The males are rich purple, bordered with black, and have an oval patch of yellow raised scales on the inner margin of the hind wings. The females are brown, sometimes dull blue towards the base, and generally with a yellow or orange band towards the hind margin of the fore wings; also visible in the male of *E. Æsacus*, H.-S.

Narope is a curious little genus, brown or dull fulvous, with pointed fore wings and angulated hind wings, much resembling the genus *Anæa* (*Nymphalinæ*) both in size and appearance; there is a tuft of hairs on the under side of the fore wings, and a large prediscoidal cell on the hind wings,

characters at once sufficient to separate it from the *Nymphalinae*. The species measure about two inches across, and are without eyes on the under side.

The species of *Dasyophthalma*, the last genus of the *Brassolinae*, are about three or four inches across. The male of *D. Rusina* is brown, with a yellowish band, angulated at the costa, crossing the fore wings near the margins, and a corresponding white band across the middle of the hind wings; there is a brilliant blue patch on the inner margin of the fore wings at the base, and within the white band on the hind wings; the pale bands are whitish beneath, and that on the fore wings bifurcated; above the branch is a very small eye, and there are two larger, orange, black and white eyes on the costa and the middle of the hind wings within the band; the whole under surface is striated with black and gray. *D. Creusa*, Hübn., is velvety black, tinged with green, especially on the hind wings, banded with pale yellow on the fore wings (the stripe broadest at the inner margin), and spotted with yellow on the costa of the hind wings, or with some greenish spots running half across the wing from the front angle; the under side of the hind wings is striated with brown and dull green, with three eyes arranged triangularly; there are also two small eyes near the tip of the fore wings beneath.

ENTOMOLOGICAL RAMBLES, 1877.

By J. B. HODGKINSON.

(Continued from p. 19.)

EARLY in June I went with our Scientific Society on an excursion to White Well, about twenty miles from here, on the borders of Yorkshire. I had an idea that *Talaporis pubicornella* might occur there, as well as at Grassington; but I was quite disappointed, both with the vegetation and the district generally. It was all that could be desired for hill and dale, rivers and woods, but not of a character for an entomologist: the broad acres were eaten bare by sheep, and the woods tenanted with game; one could not look over a stone wall, or be looking diligently for larvæ, even on the road-side, but a gamekeeper put you under his supervision. I had only a couple of hours, under a blazing sun, and a limited permission to ramble over a small place of my own selection, where the keeper did not want me to go; still he

was a better sort of a fellow; and his master and I being good friends I made the most of it, and took a fine series of *Ephippiphora Pflugiana* (*scutulana*), a lot of *Depressaria hypericella* (the first time I ever met with it), several *Gelechia acuminatella*, *Eupæcilia maculosana*, *Lampronia rubiella*, &c., and one fine *Cidaria silaceata*. The walls in this district are built entirely of stones, full of fossils.

During the first week in June, the weather bitterly cold, Mr. Threlfall and I could find no moths at Witherslack worth looking after, so we went to Whitbarrow. About three miles from the inn we first turned into a large larch plantation, and found some larvæ of *Spilonota lariciana* and *Pædisca occultana*. Then on the way, amongst the stems of *Eupatorium cannabinum*, we found the larva and pupa of *Pterophorus microdactylus*, and the twisted ox-eyes yielded larvæ of *Dicrorampha consortana*. At the base of the rocks, on the wild marjoram, were the larvæ of *Coleophora albitarsella*; from the stunted blackthorn we tried hard to dislodge the larvæ of *Rhodophæa marmorella*, by no means an easy job: you must make up your mind that your umbrella will have to be carried home all to tatters and limbs broken, or thrown away as not worth mending. We did not get over a score in two or three hours, until I met with a whitethorn tree under the crags, with a lot of sheep's-wool on it. As soon as I could get my remnant of an umbrella to open, as a last try, for the wind was blowing a gale, I gave a bough a sudden knock, and then stood in amazement. I counted up to fifty, and still there were more to count. I tried again, after partly picking the last lot, and got quite a hundred off this one bush. Close by was a buckthorn tree; I put some branches in a bag, and bred quite two hundred *Laverna rhamniella* from them. Next I turned to *Ephippiphora signatana* larvæ, on the sloe, but found them very scarce, only breeding about a dozen specimens, and a few *Hemithea thymiaria*, and a small dark *Coleophora*, off the same leaves. On the *Lychnis dioica* we found a lot of larvæ of *Gelechia viscariella*. As to nothing we were glad to stay in; at least I would not stir; but my friend turned out with his lamp, anxious to get *Depressaria pallorella*, but in vain; he always brought in a good supply of *Depressaria arenella* and *D. applanella*. Even the larvæ of *Eupithecia sobrinata* were scarce, and only one *Thera simulata*; and of *Argyresthia arceuthinella*, only odd ones were out; so this out was made the best of.

Waiting for a change of weather, on the 8th of June we set off again, the weather rather better: a little more sun; still no quantity of any moths on the bank opposite the inn, which is, or has been, an entomologist's paradise. During a gleam of sunshine a moth came and dropped on a stone beside me, and behold it was *Miana expolita* (*captiuncula*); then another, and another. I thought I was in luck: however, during the three hours waiting, only three more came steering against the wind; and the strangest part of the affair was that the 9th of July used to be my set day for them, three miles from this place: and this in spite of such a cold season. In the evening *Eupithecia constrictata* was out, but very sparingly. This species was out, as well as *Hyria auroraria*; and was quite three weeks earlier than former years: the pupa must have been under the sun's influence more particularly this season. I went on to the moss-side to look for *Melanippe hastata*, but saw none; and have only seen one for a dozen years. I well remember Mr. C. S. Gregson and myself each taking about three dozen of this and *Leucophasia sinapis*; and why the latter has disappeared I know not. Some twenty-five years since I used to see them by five o'clock in the morning, flying softly along whilst I was dressing, just opposite my bedroom window. *Butalis fuscoæneella*, *Ennychia octomaculalis*, and, in the chinks of the rocks, *Psychoides verhuelletta*, were to be found; the very common *Coccyx raciniana* was only to be found by odd ones; I have known when a score could be taken in one sweep. We took a lot of larvæ of *Elachista adscitella* in the stems of grass (*Sesleria cærulea*), from which I bred over one hundred specimens. In the month of June a good many useful species turned up during several visits; a good many *Penthina prælongana*, *Phoxopteryx siculana*, *P. biarcuana*, *Lampronia luzella*, *Bucculatrix frangulella*, *Coleophora Wilkinsonella*, *Phoxopteryx uncana*, *Eupacilia nana*; for first time among the birch many good *Nepticulæ*, and some larvæ of *Pterophorus tephrodactylus*, quite a month later than usual. I had the mortification to see a lot of young larvæ of *Endrosis fenestrella* feeding upon my pupæ, and being only in time to save one. In Grange Woods there was little indeed to catch, *Grapholita obtusana* being very scarce; the only common *Tortrix* was *Ephippiphora cirsiana*, among the knapweed; two specimens of *Diplodoma marginipunctella* were flying softly under a shady nut-bush; and *Tinea semifulcella* on tree trunks, and flying in shady places along

with *T. ganomella*. By sweeping *Elachista apicipunctella*, *E. humiliella*, *E. tæniatella*, *E. zonariella*, *E. subochreella*, and *E. Gleichenella*, turned up. In vain I swept and looked from morn till eve for *Coleophora fuscocuprella*, only taking one; I saw it walking on a nut-leaf. The same spot yielded me over fifty larvæ last September, from which I did not breed a single specimen. From among the *Helianthemum* I swept some fine *Butalis fuscocuprella* and *Laverna miscella*; the tops of the *Hypericum* were twisted in all directions with *Depressaria hypericella* larvæ.

The next excursion was early in June to the banks of the Wyre, near Fleetwood, to look for larvæ of *Gelechia instabilella* in the roots of *Plantago maritima*, and *G. ocellatella* in the leaves of *Aster tripolium*. By the way, I was greatly misled for years how to find *G. instabilella* larvæ: I have looked over acres of plantain leaves to no purpose, until one day I was looking earnestly at a lot of dead, yellowish brown roots, and it just struck me how the sea-piuk looked when *Sericoris littorana* had been there. I at once broke off a dead root, and there was the fine yellow larva, with a black head, of *Gelechia instabilella*. I bred a nice series from this find. I may here note that I bred several specimens of *Ditula semifasciana*, from larvæ feeding on the wild carrot. I got them along with *Depressaria Douglasella*.

My next paper will be on July captures.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 16.)

79. *Andricus æstivalis*, Gir.—This gall may be found in great numbers, a short time after the blossom, on the thickened and shortened catkins of *Quercus cerris*. It occurs in such a manner that the galls being distributed, like the flowers, they together very much resemble a mulberry. Its shape is almost oviform, being 2 to 4 centimetres long by 1.5 to 3.5 broad. The single, greenish yellow or red galls are more or less pressed into one another, especially at the base, but are quite free at the apex. When mature each gall is cup-shaped, thin at the base, and expanding gradually to

the ragged rim. It is about 1 centimetre high, and has at the top of the rim of the cup a diameter of 6 to 8 millimetres. The under woody half of the upper empty cup is filled up, and contains some larva-cells. Dr. Giraud says, in his 'Signalements,' that he only found one larva-cell; but the smallest mature gall now before me contains more. Below this chamber a conical swelling rises in the cavity of the gall, at the bottom of the cup. When the gall is not fully matured only half of the cup shows, as you could imagine a vertical



Figs. 79 & 80.—Galls of *A. cativalis* (to the right, at foot, an imperfectly-developed gall; and to the left, above, a specimen in vertical section). Galls of *A. grossularis* (and in section).

section of it: this bears a great resemblance to a scale of a fir-cone; at the bottom of this the germ of the larva-cell is to be found. The gall-fly appears at the end of June and in July.—G. L. MAYR.

We now come to the catkin-galls. If we reckon the catkin specimens of *S. baccarum*, which has already been described amongst the leaf-galls (Entom. x. 206), there are ten species known to gall the oak flowers: two of these, this and the one next described, are confined to the Turkey oak. Hence it is not likely this gall occurs in Britain, although Mr. Cameron took an *Andricus*, near Loch Lomond, on May

20th, which he says must be either *A. æstivalis* or a new species. Dr. Giraud examined two hundred specimens of this species, and only found four males. He also bred *Aulax pumilus* from these galls. Dr. Mayr gives *Callimome regius* as a parasite.—E. A. FITCH.

80. *Andricus grossulariæ*, Gir.—This currant-gall, which also occurs on the Turkey oak at the end of May, gives the tree a strange appearance, covered with its great masses. Although not generally common, thousands may sometimes be found on a single tree. From their beautiful red colour, and from their accumulation on a catkin of the oak, it looks from a distance as if the tree were covered with currants. The single gall is inverted pear-shaped, with the thick end towards the flower-stalk, whilst its conical end forms the apex. It is 6 to 7 millimetres long and 5 to 7 thick. It is green at first; this soon becomes red, and finally, when mature, it is reddish brown. Its surface is moderately glossy, sometimes slightly wrinkled, and covered with very scattered and very short simple hairs, such as grow on the flower-stalks and on the leaves of the Turkey oak. It is thickly covered with hairs at the apex. In section it exhibits a soft parenchyma. Near the base of the gall there is a yellow, moderately hard, oviform, perpendicularly placed inner gall; above this there is a moderately wide channel, which extends to the top of the gall. The perianth and anthers are situated at the base of the gall; but anthers may often be found springing from the gall itself, so that the gall may be considered as developed from the base of the flower. When it happens that there is only one gall on a flower-stalk, we generally find the ordinary shortened catkin covered with five to ten galls at its thick base, densely packed on one another. At the latter end of June the gall-fly bores through the upper end of the inner gall, forces itself through the channel, and, in order to free itself, bites a hole at the apex of the gall. Galls, from which the fly has emerged, may sometimes be found on the trees in autumn.—G. L. MAYR.

This gall, like the preceding, is only to be found on the male flowers of the Turkey oak. *Synergus variabilis*, Mayr, is an inquiline; and *Megastigmus dorsalis*, Fabr., a parasite in it. Both appear a little later than the gall-maker. Dr. Giraud also mentions the presence of cecidomyideous larvæ in the "cavité supérieure."—E. A. FITCH.

ICHNEUMONS;

WITH DESCRIPTIONS OF THE PREVIOUSLY UNKNOWN SEXES OF
TWO SPECIES.

By JOHN B. BRIDGMAN.

WITH what intense disgust are these lively and elegant insects generally looked upon by lepidopterists. How many look back with regret on the fine, rare moths they might have bred but for those "nasty" ichneumons, which, in most cases, are unfortunately immediately destroyed—a practice that is deeply to be regretted. If lepidopterists could be induced to save such ichneumons as they breed, and make a note of the species from which they were bred, a large amount of useful knowledge would be gained that is now quite thrown away, for no one has the same opportunity of making such valuable notes as the breeder of butterflies and moths.

I think it is a great pity that more of our working entomologists do not take to some of the less beaten paths of Entomology than *Lepidoptera* and *Coleoptera*; none are less devoid of interest, and many are more replete with it. Take, for example, the insects named at the head of this paper, and think for a moment of the important part they play in maintaining the balance of Nature; think of the enormous quantities of larvæ that are annually destroyed by ichneumons, which thus become valuable helps in keeping their numbers within bounds. It is not only the larvæ of *Lepidoptera* that are attacked, but those of sawflies, gallflies, flies, and beetles, are also destroyed. We cannot but admire the variety of forms that are met with. The majority are exceedingly graceful: their slender antennæ, which seem ever on the move; the colours of their bodies and legs are very pleasing,—black, red, yellow, and white, in almost every possible arrangement. The aculeus, or ovipositor, also varies exceedingly in length, size, and direction; in some it is considerably longer than the whole body, as in *Rhyssa*, *Glypta*, &c.; and this is very necessary for these insects, which deposit their eggs in wood-boring larvæ, such as the great sawfly (*Sirex*). From this elongated ovipositor every variation in length is to be found; some, indeed, have it not protruded at all: this is the case in many of the genus *Ichneumon* and *Tryphon*. Others have it quite straight, as in the genus *Cryptus*, those elegant Ichneumons which have the first segment of the abdomen petiolated,

and the middle submarginal cell of the fore wing five-angled. In others the aculeus is curved upwards more or less, especially so in the *Ophionides* species, which have the abdomen more or less compressed; in some it curves so very much that one wonders how the insect could put it to its proper use, *viz.* to perforate the skin of the larvæ in order to deposit the egg or eggs. Ovipositors are sometimes very slim, and appear quite inadequate for the function they have to perform. Such is not indeed the case, as I have found out by that best of all tests—practical experience. I once caught a large, red and black *Cryptus*, with an aculeus as long as its abdomen, and was holding it in my fingers, when to my surprise it turned the sting downwards at right angles to its body, and then with a jerk of its body caused this little bristle-like appendage to give me as sharp a sting as if it had been done by a wasp.

There is one genus concerning which information is much wanted; that is the apterous little *Cryptides*, of the genus *Pezomachus*, which greatly resemble small ants, but the antennæ point out the difference at a glance: some of these have been bred from spiders' nests. I bred *P. zonatus* from a nest, which I found last spring, attached to the upper part of a blade of grass: it looked like a small dab of mud on the end of the blade. The larva of this *Pezomachus* did not require all the eggs the nest contained for its sustenance, and consequently many little spiders were afterwards hatched. Of this genus there are about fifty species recorded as British; eight only are males, the rest being females. Few of these species have the sexes associated, without doubt. Lepidopterists might greatly assist in determining the sexes. I once found the cocoon of the whitethorn sawfly (*Trichiosoma lucorum*) with the end cut off in the usual way by the fly, clearly showing that a sawfly had emerged from it, but at the bottom were four cocoons containing living larvæ; two of these I killed accidentally, but the other two produced ichneumons, *Cryptus migrator*. Of course I cannot be certain that the eggs were laid in the larva of the sawfly, and on becoming full-fed had issued from the larva, and formed their cocoons inside of the cocoon of the sawfly, having left sufficient life in the sawfly larva to enable it to go through its transformations and to emerge a perfect insect; still such is the inference. Some ichneumons deposit only a single egg in a larva, whilst others insert a quantity; size probably dictates the number to the ichneumon that she may

deposit. The larvæ of these parasites do not always pass through all their stages without let or hindrance, for just as they make the first attack they in like manner are attacked by other ichneumons;—the parasite of the cabbage butterfly, whose cocoons look like a cluster of small yellowish comfits, and are to be found about palings or nooks of gardens, is subject to such attacks from several other *Ichneumonidæ*: this year (1877) I bred two species of *Hemiteles* and one of *Mesochorus* from these cocoons. We cannot but admire the instinct, as it is sometimes called, which enables the ichneumon to detect such larvæ as have not already been attacked by parasites, and to teach it the proper depth to deposit the eggs; not to pierce so deep as to kill it, still deep enough to prevent the egg being got rid of when shedding the skin. Before concluding I would mention the opposite sexes of two ichneumons I have taken, which I have not yet seen described.

Exetastes calobatus, Gr., male, differs only from the female in having three marks on the face; scutellum and the front coxæ yellow; the intermediate coxæ and all the trochanters red, the posterior one slightly tinged with black at the articulations. *Phytodietus scabriculus*, Gr., female, differs only from the male in being a little larger, and in having a narrow white ring in two joints of the antennæ, about one-third from the apex.

In concluding this rambling paper I would say to lepidopterists and others, who may breed these insects and would save them, that they should always be killed with sulphur; then if they are left for a day or two in a damp box the legs and wings can be very easily displayed, although they may not be regularly set. The larger ones are best mounted half-way up rather long pins, with the wings anywhere rather than over the back. It is better to gum the smaller ones on paper or card, with a mixture of gums tragacanth and arabic; the legs, wings and antennæ should be stretched out, at least on one side; and as the mouth and antennæ beneath are important characteristic points, a small hole should be made in the card, about one-sixteenth of an inch in diameter, and the insect mounted with its mouth over the hole; this will allow of these organs being easily examined.

Norwich, December 30, 1877.

COLLECTED OBSERVATIONS ON BRITISH SAWFLIES.

By the late EDWARD NEWMAN.

(Continued from vol. ix. p. 67.)

THERE are, then, two very distinct kinds of resemblance, which I would call endomæous and extomæous. The first relates to internal and intrinsic characters; frequently, but not necessarily, also to habits, economy, and food. The second only to external or superficial characters; those characters which are the first to strike the eye and the mind of him who applies eye and mind to the subject. I will give an instance of this in each of the three great tetrarchies of *Endosteates*.

In sucklers the resemblance between the flying phalanger (*Petaurus*) and the kangaroo (*Macropus*) is endomæous, but between the flying phalanger (*Phalangista*) and flying squirrel (*Pteromys*) it is extomæous. I omit to mention the birds because the natural distribution of that class has not received the searching investigation of science. In reptiles the resemblance between the newt (*Triton*) and the frog (*Rana*) is endomæous; that between the newt and the lizard (*Lacerta*), extomæous; although the similarity of form is so exact that Linnæus placed them in the same genus, calling them *Lacerta agilis* and *L. palustris*; and as regards our British reptiles he made them consecutive. In fishes the resemblance between the eel (*Anguilla*) and the muræna (*Muræna*) is endomæous; indeed so nearly are they alike in structure that ichthyologists place them in the same family. On the other hand, the resemblance between the muræna and the lamprey (*Petromyzon*) is entirely extomæous; it is external, although so close as to deceive all but the educated eye of science. This external, or extomæous, resemblance has long been familiar to naturalists, and has been utilised with the view of substantiating a host of hypotheses, in some of which it is called protective: it is the relation of affinity and analogy so eloquently advocated by Mr. W. Macleay.

Another observation seems absolutely necessary, that is to caution the inexperienced reader against supposing that the boundaries of groups are rigidly defined in Nature. Two centuries ago the immortal Ray told us this was not the case. He says:—"As Nature never passes from one extreme to another, except by something lying between the two, so she is accustomed to produce creatures of an intermediate and doubtful character which partake of both extremes, and so

completely connect them as to render it altogether uncertain to which they more truly belong."—*Ray: Preface to 'Historia Plantarum.'*

Ideas to the same effect were subsequently avowed by Linnæus, Lindley, and a host of others, and have never been controverted; neither is it possible to controvert such a self-evident truth. Then, also, with regard to exceptions, these do and must occur without interfering with the general utility of a scheme. Some have said that the *exception* establishes the rule; but without going to the full extent of this apparent paradox, I entirely concur with its spirit, since I know that an insect may be legless, wingless, antennæless, without interfering in any manner with the propriety, or even the necessity, of arranging it according to the structure of these organs, or of neglecting or undervaluing the teaching of that structure or that economy which is most emphatically pronounced and most prominently displayed.

Too much stress can hardly be laid on the fact that *every* character must be consulted in the course of sub-division, or, what Cuvier calls, the "distribution" of the Animal Kingdom, not necessarily all at once, or all at every stage of the process of "distribution," but every character will occasionally crop up more prominently than the rest, and must then be utilised. In the foregoing remarks, structure and the arrangement of bones were thus utilised in my *first* division; number of legs in my *second*; metamorphosis will be employed in my *third*; combined with varied form and character of the mouth and food and economy in the *fourth*. It must not be inferred that no other differences than those mentioned exist in either case, but that these are the most salient, and appear most distinctive in those cases in which they are employed.

There can be no doubt that a "system of Nature" exists, but that the key to this system is not placed in our hands. The distinctive characters are Nature's, but the mode of employing them is man's, and man is very apt to go astray while attempting to discover and define the principles on which she works. It has, however, been shown by Cuvier that the animal kingdom is divided into four provinces, and Latreille in his last great work, the '*Causes d'Entomologie*,' having shown that one of these provinces, *Exoiteales*, is again a tetrarchy, the same will be adopted here without hesitation and without alteration.

(To be continued.)

REVIEWS.

Aeltere und neue Beobachtungen über Phytopto-Cecidien.
By Dr. F. A. W. THOMAS. Halle-on-Saale. 1877.

THIS short pamphlet, of 'Former and Recent Observations on Phytoptus Galls,' gives in its fifty-nine pages much information of value. It is reprinted from the 'Zeitschrift Gesam. Naturw.' (vol. xlix., 1877), and is accompanied by one plate. It comprises a chronological sketch of the literature of the subject from the first recorded observations to the end of 1870; also some notes on gall structure, and on Beyerinck's classification of the mite galls. These are followed by descriptions of new or little known *Phytoptus* galls, in continuation of the author's previous publications in the 'Nova Acta' of the Leopold-Charles Academy.

The first recorded observations of mite-galls appear, according to Hardy, to have been those of the brothers Baubin, on the silky-haired growths of *Thymus serpyllum*. The subject is then traced onwards,—through Malpighi's observations on the vine *Erineum*, Tournesort's conjecture in 1698 as to the cause of the diseased growth lying in insect puncture, Réaumur's descriptions of the leaf-galls of the lime and sycamore (still without any knowledge of the tenants and immediate cause), and Vallot's numerous discoveries and observations,—to the period when, through Turpin's examination, the formation of these galls was found to be attributable to mite agency.

The history of the gradual dawn of certain light on the subject is much the history of the experience of each original observer of modern days. There is in either case the attention attracted by the diseased growth (the "felts" of the early botanists), the gradual discovery of the *Acarid* presence, and the long investigation requisite for proof as to which of the various tenants is the fundamental cause of the diseased structure. This history is necessarily full of references (which are fully given by Dr. Thomas) to the publications of continental and American observers, as well as of our own country.

Descriptions and notes on structure of previously unknown or little known galls occupy about half the pamphlet; these in many cases occurring on species commonly found with us, *e.g.* of *Veronica*, *Stellaria*, *Cerastium*, &c., so as to make the observations with the previously published notes available as

a kind of manual for our own as well as continental observers. The index refers to seventy-eight distinct plant-genera; and altogether the pamphlet is of interest for perusal, as well as of value for reference.—E. A. O.

Sketches of Animal Life and Habits. By Dr. ANDREW WILSON. W. & R. Chambers: London and Edinburgh. 1877.

WE have before had occasion to notice works by Professor Andrew Wilson, who as a popular writer on Natural-History subjects has in this work excelled himself. This is saying much, when we know what he has already done towards creating a taste for the study of the most fascinating and beautiful of all the sciences. His style is such that many people on reading his books and scattered papers cannot fail to take a deeper interest in the, to them, hitherto despised atoms of life, which they have been passing as animated nothings. In these 'Sketches of Animal Life and Habits' Professor Wilson, in his usual pleasant and popular manner, leads us step by step from the lowest forms of life, as shown in the animalcules, which we may find in the water we daily drink, or which created such wonder when dredged from the deep sea by the members of the recent 'Challenger' Expedition, on by degrees to the higher reptiles; at which stage we leave "these cold-blooded creatures" for the higher animals. Though thus only noticing the lower half of animated Nature, he finds in it a text of such interest that his readers cannot fail to follow him to the end.

After treating of the lowest animals the author gives us some most readable chapters on "Sea Flowers," "Sea Eggs," "Sea Butterflies," &c.; coming to what will most interest the readers of this magazine in his chapters entitled, "Some Curiosities of Insect Life," and "Animal Disguises and Transformations." In these both the young and elder entomologist will find much to both instruct and interest him.

In recommending this little book to our readers, we would remind them that in pursuing their favourite branch of Natural History it is always well to try to understand the relation of each group of animals to its neighbours, thereby learning where one group ends and another begins, or where in the scale of Nature any particular group should be placed, and why it should be so placed. In this book Dr. Wilson gives many hints and suggestions, which will certainly lead many

to extend their studies who were hitherto mere collectors of cabinet specimens. This work is the more interesting on account of its beautiful and numerous illustrations.—ED.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THECLA PRUNI REPORTED IN HAMPSHIRE.—I observe in Mr. E. K. Robinson's interesting note on *Lepidoptera* near Petersfield, Hants, the mention of the capture of *Thecla Pruni* in that district. So far as I am aware the occurrence of this very local butterfly has not hitherto been recorded in Hampshire (its extreme range southward being apparently North Bucks); and speaking from my own knowledge of its habitats in the Midlands I do not think its presence in that county is to be looked for. Perhaps Mr. Robinson will kindly confirm or correct his note of its capture.—HAROLD CONQUEST; West Lodge, St. Ann's Road, Stamford Hill, N., December 13, 1877.

[Mr. Robinson thinks this an error of transcription when copying his list of captures. *Thecla Betulæ* was the species intended.—ED.]

ACRONYCTA MYRICÆ NOT A DISTINCT SPECIES.—The following extract from a letter received from Dr. Staudinger will be interesting to British lepidopterologists:—"Thank you kindly for the two specimens of *Acronycta myricæ*, Gn. I received before specimens of this species from England, and saw many there, and I find that they are quite identical with the alpine form of *A. euphorbiæ*, named *montivaga*, also by Guenée."—F. BUCHANAN WHITE.

CARPOCAPSA POMONANA AND **HEUSIMENE FIMBRIANA**.—Having put some larvæ of *Carpocapsa pomonana* in a large phial, I found on examination that two of them had entered the cork to become pupæ. Might they not likewise enter the bark of the apple trees in the same way? I was surprised last spring to find that I had bred four *Heusimene fimbriana* from a piece of worm-eaten oak bough, brought from Hendon, in February.—H. SHARP; 16, Huntsworth Terrace, Portman Market, London, January 14, 1878.

TINEINA REARED IN 1877.—*Harpiteryx scabrella*.—I bred a fine series of this from larvæ beaten from hawthorn, at Loughton, in the middle of June. *Antispila Treitschkiella*.—I am indebted to the kindness of Mr. Sydney Webb

for the first supply of larvæ of this beautiful insect, and, profiting by it, I went at the end of September to a hedge in Kent, composed principally of dogwood, and collected a large number, which were then nearly full-fed. The mined leaves were placed on fine earth in a flower-pot, and covered with a glass cylinder: as the larvæ cut out their cases the leaves were removed. The pot was kept exposed to the full influence of the weather, till the emergence of the moths in July, when I reared a large number.—WILLIAM MACHIN; 22, Argyle Road, Carlton Square, E., January 24, 1878.

THE BRITISH HEMIPTERA-HOMOPTERA.—While agreeing generally with what Dr. Power has said (*Entom.* xi. 2), I yet take exception to his deterrent remark, that of the British *Homoptera* "we have scarcely even a satisfactory catalogue, much less description, of those which are known." All the species of *Cicadaria* and *Psyllina* known up to 1876 to inhabit Britain are included in the synonymic 'Catalogue of British Hemiptera,' published by the Entomological Society of London in that year; and, except the oldest and well-known species, all have been described in the 'Entomologist's Monthly Magazine' and the 'Transactions of the Entomological Society.' With respect to the *Aphidina*, Mr. Buckton's 'Monograph of the British Aphides,' published by the Ray Society in 1876, is a good contribution to our knowledge; and when this is completed all that will be wanting will be a proper list and descriptions of the few British *Coccina* and *Pediculina*. There exist, therefore, abundant guides for those who are disposed to leave the beaten track, and work in a field that offers rich inducements to investigators.—J. W. DOUGLAS; 8, Beaufort Gardens, Lewisham, January 5, 1878.

BLOTCHED HOLLY-LEAVES.—I in no way exaggerate if I say that quite fifty per cent. of the holly-leaves that came under my notice last year were blotched by *Phytomyza obscurella*, Fallen. I noticed this in many localities, both in Essex and Middlesex. When these affected leaves were used in church or room decorations they soon had a very scorched and withered appearance. This year I have scarcely seen a single holly-leaf tenanted by the *Phytomyza*. The meteorological conditions were probably unfavourable for the oviposition of the little dipterous, although they were so favourable for the flowering and fruiting of its food-plant. The fly emerges in May and June, a little later than the

holly blooms. *P. obscurella*, like most of its leaf-mining congeners, is preyed upon by two parasites, a *Braconid* and a *Chalcid*, unless the latter be a parasite of the second degree.—EDWARD A. FITCH; Maldon, Essex, December 28, 1877.

OBITUARY.

MR. THOMAS VERNON WOLLASTON, M.A., F.L.S.—The appearance of 'Coleoptera Sanctæ-Helenæ,' by Mr. Wollaston, the last of the many valuable contributions of its talented author to entomological science, has been sadly followed by intelligence of his decease. For the last thirty years he had suffered from weakness of the lungs, accompanied by the occasional rupture of the vessels, through which, on the 4th of January last, he passed from a life spent in valuable labour up to its latest moments. Mr. T. Vernon Wollaston, of the old family of Wollaston, of Shenton, Leicestershire, was the tenth son and fifteenth child of the Rev. Henry John Wollaston, rector of Scotter, Lincolnshire. He was born on March 9th, 1822, and educated at the Grammar School, Bury St. Edmund's, and Jesus College, Cambridge, where he continued to reside some time after taking his degree. With an inherited love for Natural History in his blood—he was great, great-grandson of Dr. Wollaston, the author of the 'Religion of Nature' (1720), and was related to William Hyde Wollaston, M.D., and vice-president of the Royal Society—it soon displayed itself in his fondness for collecting *Lepidoptera* when at school; and Mr. Wollaston soon became well known as a valued naturalist, and especially for his researches into the *Coleoptera* of the Madeiran, Canarian, and Cape Verde Archipelagos (which he personally explored, now many years ago, on a yacht voyage, in the companionship of his friend Mr. Gray), and also his investigations of their land-shells, as recorded in the 'Testacea Atlantica,' still on the verge of publication at the time of the author's decease. Mr. Wollaston's valuable writings on the enumeration, description, and critical examination of the coleopterous fauna of these islands, and especially his account of the insects of the islands of the Madeiran group, embodying in his own clear and highly-finished style the results of his personal researches, are well known to entomologists,—in the 'Insecta Maderensia,' published in 1854; the Catalogue of his own

collection of the Coleopterous Insects of Madeira, 1857; that of the 'Coleopterous Insects of the Canaries,' 1864; the 'Coleoptera Atlantidum' (enumerating those of the Madeiras, Salvages, and Canaries), 1865; and the 'Coleoptera Hesperidum,' 1867 (enumerating those of the Cape Verde Archipelago). His collections and types being purchased for the National Collection, his works on the *Coleoptera* of Madeira and the Canaries were published as British Museum Catalogues. His volume on the 'Variation of Species,' dedicated to Mr. Charles Darwin, and published in 1856, is well known. His shorter papers of original research and critical disquisition—contributed to our own, and in some cases foreign, scientific journals—range over a period of more than thirty years, beginning with Notes in the 'Zoologist,' on the *Coleoptera* of the South of Ireland, of South Wales, of some districts of the West of England, and of the South of Dorsetshire. Many papers—relative to the "Coleoptera of the Canary and Cape Verde Islands, and Madeira;" on the "Atlantic *Cossonides*" (to which he especially directed his attention); on "Some of the Coleoptera from the Cape of Good Hope;" with others on "Structural Peculiarities," "Variation of Species," "Revisions and Notes of Diagnostic Characters;" showing the unwearied research of their author—followed in the 'Annals and Magazine of Natural History' and other serials; till the long record of skilful labour ceased with his paper on the "*Sphenophorus striatus*," the recently arrived Banana weevil of Madeira, forming a contribution to the Economic branch of Entomology, of which he watched the progress with deep interest. In the autumn of 1875, feeling it desirable to seek a warmer climate, he devoted himself to utilizing his time to the utmost in scientific research, and every assistance to investigation being furnished him in St. Helena, through the assistance of Lord Carnarvon, the governor's residence ("Plantation House"), within an hour's ride of the grand central ridge, still clothed with the aboriginal vegetation, was placed at his disposal; and he devoted himself assiduously to his work, in the companionship of his accomplished wife, herself a skilful lepidopterist, and his old friend and previous companion Mr. John Gray. His wife, to whom he was married on the 12th of January, 1869, and who entered most heartily into all his pursuits as a naturalist, was a daughter of Joseph Shepherd, Esq., of Teignmouth. Of this work we have the record in the '*Coleoptera Sancta-Helena*,' which may well be taken for a

model of entomological description, in its minute differentiation of the two hundred and three species found on the island, with their ordinary habitats; and full additional observations as to general points of location, distribution in the neighbouring Atlantic archipelagos, and all special peculiarities worth noting. The preface is of great general interest, pointing out the importance of the island from its extreme isolation (both by distance and the depth of the surrounding "deep-sea" soundings) in possibly throwing light on points of geographical distribution. Following up this subject in the *Coleoptera* under observation, he gives a careful elimination from the two hundred and three species known up to the 4th of September, 1875, of the fifty-seven of which the majority are well nigh cosmopolitan, and then of the seventeen more which appear to have been accidentally brought or doubtfully found on the island; and of the one hundred and twenty-nine then remaining he shows the enormous proportion of ninety-one to be *Rhynchophora*, the whole of these being either "*Cossonids* or *Anthribids*;" the latter numbering twenty-six species; the former, fifty-four. Mr. Wollaston's pages on the presence of these "wood-boring" and "foliage-loving" weevils, on an island now almost denuded of all but the remains of its ancient luxuriant vegetation, are of rare and exceptional interest, as giving a reliable observation of exact conditions at a given time, and in a perfectly isolated locality, by which the degree, coincident disappearance of aboriginal vegetation and its phytophagous tenants may be traced forwards. This, Mr. Wollaston's last contribution to entomological science, is characteristic of its author in the finished elegance, as well as clearness of its style, and in the gentleness with which, whilst he states his own views as to the doctrine "of creative arts" being not necessarily "unphilosophical," he leaves the subject open to others. On reaching Madeira Mr. Wollaston's temporary residence was unfortunately placed at too high an elevation, his health giving way, and this delayed his return; but still, as ever, this was referred to by himself as a secondary matter, except in its interference with his work. He returned to his home, at Teignmouth, in the early summer of 1877, and thenceforward devoted himself to the task of arranging the valuable mass of information he had acquired in his absence, and of which he leaves us the record. Mr. Wollaston's name will remain as a minute and accurate investigator, and clear reasoner on the results in the Science he loved so well:

devoted to it, and his friends and fellow-workers in the same wide field, his interest was unfailing in their welfare, and the advance of scientific progress. He was a man of highly refined and accomplished mind, as well as of great scientific attainments, and will be greatly missed from the ranks of our leading naturalists, as well as by those less gifted than himself, whose progress he aided by his encouragement and sound counsel.

MR. ANDREW MURRAY, F.L.S.—It was with much regret we received intelligence of the death of this accomplished naturalist, which took place at his residence, 67, Bedford Gardens, Kensington, on the 10th of January last. His health had not been strong since a severe illness following on his return from his American expedition of 1873. In the course of the last season further indisposition followed, and he gradually sank; but so assiduously occupied with his labour of scientific usefulness to his latest days, that few but those intimately acquainted with him were prepared for hearing of their close. Mr. Murray was the eldest son of William Murray, Esq., of Conland and Duncricvie, N.B., and was born in Edinburgh, on the 19th of February, 1812. Few particulars are known to us of his life in Edinburgh, where he resided till 1860; but as with most lovers of natural science this predilection asserted itself in his early years. He was educated for the law, but devoted some attention to the study of medicine, and attended the Edinburgh scientific lectures, of which, judging by the reminiscences of his later life, he must have been an attentive hearer and careful analyst. During the last few years of his life in the northern capital he was very active scientifically. In 1858 he was elected president of both the Botanical Society and Physical Society; and just previous to his removal to London he contributed an elaborate paper to the Royal Society of Edinburgh on the "*Pediculi Infesting the Various Races of Man*," which gave minute descriptions, and the specific variation of these creatures relative to the subject then under discussion, as to how far unity of species in the parasite showed unity of species in the animal preyed on. In 1860, as has been said, Mr. Murray came to London, and was appointed assistant-secretary to the Royal Horticultural Society. It was from this time that he devoted himself more especially to his work as a scientific botanist and entomologist, and became celebrated in the former as the monographer of the *Coniferae*, in the latter as the monographer of the

Nitidulidæ. According to the Royal Society's Catalogue he published thirty-eight separate papers from 1852 to 1863. Andrew Murray had great scientific experience. In 1869 he accompanied Sir Joseph (then Dr.) Hooker to the Botanical Congress at St. Petersburg, as one of the representatives of British science, his services there being complimentarily acknowledged by the presentation, by the Emperor Alexander, of a malachite table of great beauty. In 1871 he was entrusted with the superintendence of the arrangements connected with British contributions to the International Exhibition of Moscow of the following year. He was secretary to the Oregon Conifer Collection Committee; and in 1873 undertook an expedition to Salt Lake and California with various scientific objects. His well-known work on the 'Geographical Distribution of Mammals' was published in 1866, in which he bestows especial attention on the habitat during geological, as well as glacial, and present epochs, with copious synonymic lists, including locality, past and present, geographical classification, and coloured maps of distribution; showing at a glance the result of his own careful research. Of Andrew Murray as a botanist, and of his connections with the Royal Horticultural Society and various botanical publications, we need not write, as it is in his course as an economic entomologist that we are most interested. In early life he aided his relative, John Murray (Lord High Advocate), in his wish to provide some practically useful reading for village schools, by writing the little pamphlet, 'The Skip-jack, or Wireworm and the Slug,' which, though published without his knowledge, may be looked upon as his first contribution to Economic Entomology. He contributed many papers on Entomology to various scientific societies and publications, both home and foreign; but his great work was done in the last ten years of his life, which he devoted to illustrating the study of insects in its natural and practical bearings. It was in 1868 that the charge of receiving and arranging a government collection of Economic Entomology was placed in his hands officially. From the first he devoted himself unceasingly to the task of making this as perfect as was possible with our present knowledge, and even when on his American expedition he left the threads for its continuation. Himself an accomplished draughtsman, and a patient worker and compiler, with a great love for the subject and of general scientific research, he spared no pains in his work, whether in availing himself of scientific co-operation, or in

shaping the aid placed at his service by those less gifted than himself, in the details of field observation, and of museum illustration by coloured drawings or fac-simile modelling. This collection is already a nucleus of a very valuable, popular, and illustrated history of insect friends and insect foes; the practical value of which will generally perhaps be better appreciated in time to come, but which is already bearing good fruit for public benefit. Our countrymen in America, thanks to State help, have indeed set an example for following, and given an instance of the practical importance of Entomology. The labours of Walsh, Riley, Fitch, and Packard, leave us far behind; but the perfection of such a collection as the one now under government control would be a worthy exponent of practical Entomology in Britain. On this collection, of which one hundred and fifty cases are more or less complete, Mr. Murray was working up to his latest days, leaving a large collection of oak-galls and illustrative drawings still in progress of arrangement. To assist in the circulation of information a series of guides to the collection were projected. These were to take the form of popular handbooks to Entomology, and were to be prepared by Mr. Murray, and published under government supervision. Of the eight intended volumes one only has appeared: this treats of the wingless species, or *Aptera* (it was reviewed, Entom. x. 102). In Mr. Murray we have lost a man of varied accomplishments, a good botanist, and a good entomologist, especially with reference to *Coleoptera*. Those who knew him well, and they were many, will feel his loss, not only as a gifted naturalist, but as a true-hearted friend and an admirable man.—E. A. F.

JAMES ROBINSON.—After a painful illness there died at York, on the 14th of last October, James Robinson, aged fifty-nine years. For the last twenty-four years he was well known in the North of England as a careful collector and patient observer of *Lepidoptera*. All the spare hours from his work, as a cabinet-maker, were spent in following his favourite pursuit of Natural History. Born at Ripon, and living in York most of his life, he restricted his observations almost entirely to his native county; but there are few localities, reasonably accessible, near York, which he has not explored by night or by day. Being a genial companion, and always ready to impart to others the knowledge gained by hard experience, he is much missed by the little band of workers in Natural Science at York.—ED.



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COLIAS EDUSA.

By EDWARD A. FITCH.



Egg of *C. Edusa* magnified; eggs (slightly magnified) on clover leaf; portion of egg, showing the converging longitudinal ribs. Pupæ of *C. Edusa*: dorsal and lateral view.

THE unusual abundance, or abnormal occurrence, of certain insects in certain years, has long been a subject for varied hypotheses and speculations. Some have been disproved, others to a certain extent explained by a better acquaintance with the economy of the noted species; *e.g.*, the swarms of *Aphides* being followed by the swarms of *Coccinellidæ*, *Syrphidæ* and *Hemerobidæ*, is a familiar instance of the inspired aphorism that—"Wheresoever the carcase is, there will the eagles be gathered together." The occasional swarms of certain *Diptera* are also explicable by reference to their economy. Amongst *Lepidoptera* our two species of *Colias* have been noted *par excellence* for their periodic appearance. The older observers, believing in a hard-and-fast line, summarised that period as triennial, quadrennial, quinquennial, or septennial, each period being defended according to the immediate, though limited, experience of the individual. Mr. Desvignes' septennial theory still lingers, probably owing

more to its association with that mystical number than any actual experience:—

"Of every beast, and bird, and insect small,
Came tens and pairs." MILTON.

These periods were supposed to be influenced by the eggs or pupæ of the species lying dormant; but our knowledge of *Colias* will warrant us in considering them all as arbitrary and unsupported by facts. We know that many *Lepidoptera* pass two or more years in the penultimate state, *Bombyces* especially, and that some few take more than one year to complete their metamorphosis. These species are very probably affected in their appearance meteorologically, as no doubt is *Colias*; but we want more knowledge of our two species to say that the favourable conditions are this only.

In 1872 we were astonished by an unusual abundance of *Vanessa Antiopa*. Of late years we have had many well-attested observations of the migration of butterflies; and it is this which probably affects the appearance of *V. Antiopa*, *Pieris Daphidice*, *Argynnis Lathonia* (all unusually abundant in the autumn of 1872), and other *Lepidoptera*, in Britain. Some few find the conditions of their new establishment favourable, and establish themselves; but probably unless strengthened by new recruits every now and again we should soon lose these and other species from the British fauna. *C. Edusa* has been met with more than once in the English Channel travelling from the Continent. The following is on the excellent authority of Mr. Charles Darwin, when on his 'Beagle' voyage:—"One evening, when we were about ten miles from the Bay of San Blas, vast numbers of butterflies, in bands or flocks of countless myriads, extended as far as the eye could range: even by the aid of a glass it was not possible to see space free from butterflies. More species than one were present, but the main part belonged to a kind very similar to, but not identical with, the common English *Colias Edusa*." It is these migratory habits and a strong constitution which account for the extended geographical distribution of *Colias*. *Edusa* and *Hyale* are both common to the three continents of the Old World, and very closely-allied species are found in the New. Although originally an immigrant, from the great abundance and distribution of *C. Edusa* in Britain and Ireland, it may now be considered as thoroughly naturalised; and the numerous specimens captured last year were doubtless mostly British born. Of these I have seen some hundreds of specimens, and they vary in almost every conceivable detail.

Size.—From 1·25 to 2·4 inches. I think I have seen larger, but this was the largest measured; a male. Mr. E. Boscher took a male as late as November 13th, at Bognor, which measured 2·25 inches.

Shape.—This varies considerably, especially in the hind margin of the fore wings, which is either rounded, straight, concave or convex, and curved; the inner margin also varies slightly, as do the shape of the hind wings.

Colour.—This is also subject to much variation. The brilliant saffron or orange varies in intensity, and there is the permanent greenish white variety of the female (*Helice*, Hüb.); intermediate shades between these two, through pale yellow, are to be met with, and many specimens have been taken in 1877 with the hind wings and the fore wings differing, a few even with one wing only varying in shade. Some specimens are beautifully “shot” with purple or blue. The females of nearly all the *Coliades* seem dimorphic as to colour: in 1875 I took the pale and yellow females of *C. Hyale*, about which there was some doubt.

Fore wings.—The marginal band in the male varies slightly in shape, much in width, and in the intensity of its colouring, owing to the greater or lesser number of the yellow scales, and the conspicuity of the wing-rays; also in its continuity along the inner margin. A specimen or two has occurred in which this band is bordered with yellow on the hind margin. In the female the light spots in the margin vary from almost a continuous band to entire absence. A beautiful variety of *Hyale*, with a continuous pale band at the apex of the fore wings, taken at Market Harborough in August, 1842, is figured in the ‘Zoologist’ (vol. i., p. 259). The central black spot is altogether irregular in shape, and varies greatly in size. I have seen one or two specimens in which it is almost entirely obliterated; a few in which it has a more or less well-defined yellow centre. The presence of black scales, especially on the wing-rays, is not uncommon: in some varieties they are very conspicuous.

Hind wings.—The marginal markings vary greatly, especially in the female. The central orange spot also varies much in shape, size, and relative intensity of colouring; it is normally conduplicate, but many varieties occurred last year in which it was very small and single.

Such are the most important points of variation which have come under my notice. A few suffused varieties have been met with, and some specimens are beautifully bright red at

the base of the costa and on the prothorax. Suffusion is probably more or less common to all species; and Mr. W. H. Edwards considers the application of severe cold to the pupa as a cause (Can. Ent. ix. 203). I heard of no monstrosities last year; but a specimen with three wings female, and the fourth (left fore wing) male, is recorded in



Colias Egea (third brood, male).

the 'Entomologist' (vol. v., p. 447). Twelve varieties are figured in the accompanying plate, but it has been difficult to select from the numerous beautiful specimens which have been kindly placed at our disposal. Especial thanks are due to Mr. Bernard Cooper; to Mr. Eedle; and to Mr. Meek for procuring the four varieties belonging to Mr. Harper.

DESCRIPTION OF PLATE.

Mr. H. T. Mennell's suffused female. Taken by himself at Bognor, Sussex, August, 1877. Unfortunately not a good specimen.

Mr. C. A. Briggs' very dark bordered female. Taken at Folkestone, Kent, in 1877.

Mr. C. A. Briggs' very light bordered female. Taken at Folkestone, Kent, in 1877.

Mr. B. Cooper's pale saffron variety. Taken at Green Street, near Sittingbourne, Kent.

Mr. P. H. Harper's female variety, with fore wings *Helice*, and hind wings *Egea*. Taken near Enfield, Middlesex, in 1877.

Mr. P. H. Harper's very curious pale *Helice*. Taken at Brighton, Sussex, in 1877.

Mr. W. H. Harwood's female, varying curiously in shape and in the spots in the fore wings. Taken near Colchester, Essex, August, 1877.

Mr. P. H. Harper's variety, with the tip of the fore wings suffused to the central spot. Taken at Brighton, Sussex, in 1877.

Mr. P. H. Harper's female variety, with curious pale markings in the border of the hind wings. Taken at Brighton, Sussex, in 1877.

Mr. T. Eedle's small female of the third brood; bred. A curiously shaped male of the same brood is figured in the woodcut.

Mr. W. P. Weston's curious specimen, with the right side *Helice*, and left side *Egea*. Taken at Finchley, Middlesex, 7th August, 1876.

Mr. B. Cooper's large dark bordered *Helice*. Taken in Kent in 1877.

The species of *Colias* inhabiting Europe have been split up into about thirty species by different authors. Staudinger

retains seventeen; Kirby enumerates fifty-five, twelve of which are European. Could we but get series of each supposed species, such as could be procured of *C. Edusa* this year in Britain, and allowing for the variation attributable to geographical distribution or climatal causes, it is more than likely that the most discriminating speciologist would be baffled. As an instance of community of descent the series would be perfect. Should a great *Hyale* year, as were 1842 and 1868, occur before our *Edusa* experience is forgotten, we may probably deduce some knowledge from our own two species. We certainly now have *C. Edusa* varieties resembling in almost every detail *Chrysotheme*, Esp., *Myrmidone*, Esp., and even the light yellow *Erate*, Esp. I have also seen several males with such a distinct purple gloss, and with the mealy borders to the wings, that they certainly approach *Aurorina*, H.-S., though perhaps in a mild form. It has been said that *Erate* is a hybrid between *Edusa* and *Hyale*; it is most certainly a connecting link between the two species.

"The boundaries (*grenzen*) between the species of this genus (*Colias*) are very uncertain; the more one compares examples from various localities the more inconstant appear the specific characteristics, which suffice to distinguish the ordinary species" (*Schmetterlinge von Europa*, vi. 21). So says Dr. Herrich-Schäffer in his beautiful work. The clouded yellows are generically identical, but as our knowledge of them increases the question will soon develop itself—Are they specifically dissimilar? Many which are now recognised as good species will, like our *Helice*, have to descend from specific to varietal rank. Were our small, pale, narrow-bordered, third brood of 1877 perpetuated in a higher latitude or altitude, we should probably have quite as distinct a race as any known *Colias*. In 1877 *Helice* was taken *in cop.* with male *Edusa*; and, what is more convincing, I learn through Mr. Meek, that Mr. Gates, of Brighton, bred a male *Edusa* from an egg laid by *Helice*. From eight or ten eggs only one reached the pupa state.

Before summarising last season's results a retrospect of the occurrence of the species in Britain may not be without interest. *C. Hyale* was common in 1821, 1826, 1828, 1835, 1842 (particularly so, but no *Edusa* seen), 1843 (many, also *Edusa*), 1844 (several, *Edusa* much the commoner, as in 1843), 1847; in 1849 there were a few, 1851 (one record), 1855 (rare, *Edusa* common), 1856 (two records), 1857 (very common, as also was *Edusa*), 1858 (common), 1859 (one record), 1867

(one record), 1868 (very abundant, *Edusa* was not common), 1869 (one record), 1870 (scarce), 1872 (common, not so *Edusa*), 1875 (abundant), 1876 (common). *C. Edusa* was abundant in 1804, 1808, 1811, 1825 (one), 1826 (very abundant), 1831 (plentiful), 1833, 1835 (both species common), 1836 (common), 1839 (common, many in June), 1843 (abundant), 1844 (very common), 1845 (scarce), 1847, 1848 (one record), 1851 (one record), 1852, 1855 (common), 1856 (common), 1857 (very common, recorded to November 18th), 1858 (very common, particularly in June, also to November 7th), 1859 (very abundant), 1861 (scarce), 1862, 1865 (common), 1867 (several), 1868 (common, but *Hyale* much more so), 1869 (several), 1870 (scarce), 1871 (one record), 1872 (not uncommon), 1875 (very common), 1876 (common). These records are collated from the 'Magazine of Natural History,' the 'Entomological Magazine,' the 'Entomologist,' the 'Zoologist,' the 'Entomologist's Weekly Intelligencer,' the 'Weekly Entomologist,' and the 'Entomologist's Monthly Magazine.' They are ample to show distinctly the capriciousness of the occurrence of these two insects in Britain.

The following are selected records for 1877:—

BUCKS.—Common near Marlow, from beginning of August to end of September; fifty-five taken; *Helice* occurred in about the proportion of one to twenty: F. N. Jackson.

CARNARVON.—A freshly-emerged *Helice*, taken at Bangor on 3rd October; the only *Edusa* seen in Wales during a fortnight's stay: S. D. Bairstow.

CORNWALL.—Common at Penzance, also seen within a short distance of the Land's End; second week in September: H. Miller, jun.

DERBY.—Taken in Darley Abbey Gardens; last taken 9th September: S. J. Rowberry.

DEVON.—A tattered individual, seen near Torquay, about the 5th or 6th May; several fine bright males seen at the end of the month, and the species became common by the middle of June; very abundant during the summer; several seen on October 14th; the last on October 29th: G. B. Corbin. A friend tells me *Edusa* was out and common, at Sidmouth, the second week in October: H. T. Dobson, jun.

DUMFRIESSHIRE.—Common this year throughout the district; not seen previously since 1862; first seen June 3rd; in scanty numbers throughout June, July, and August; the autumn brood was very common from September 10th to October 9th: R. Service.

ESSEX.—Seen on the wing, but very much worn, on October 8th and 14th; and on October 24th a fresh male was caught at Wrabness, near Harwich: F. Kerry. Common at Walthamstow; last noticed October 5th; one *Helice* taken September 15th: B. Cooper.

GLOUCESTERSHIRE.—Very common near Ailberton and Lydney; first seen June 3rd; it disappeared from the first week in June to the end of July; from then to October 3rd, very common; only one *Helice* seen, October 2nd: Rev. D. G. L. Browne. Common at Wotton-under-Edge until October 4th, on which day I took five specimens: V. R. Perkins. At Cheltenham, in September: Rev. D. G. L. Browne.

HANTS.—Abundant at Lyndhurst; last seen October 3rd: H. Golding-Bird. Seen near Buriton on October 6th: F. N. Jackson. Very abundant in July and August: G. B. Corbin.

HEREFORDSHIRE.—Very common in August and September, commoner than whites; I saw one in the centre of the city of Hereford: J. B. Pilly. First observed June 8th; last seen October 9th: Rev. C. Kengelbacker. Common on June 10th; seen previously; one taken by my brother the last week in May: P. H. Horne.

ISLE OF WIGHT.—I saw several worn *Edusa* and one *Helice* at St. Helen's, on September 26th: H. Golding-Bird.

KENT.—Swarmed at Herne Bay in August; my brother took a fine series of *Helice* there: B. Cooper. Folkestone, equally fresh specimens taken the first week in June, August, and October; very common on October 20th; two specimens taken just after emerging, on the morning of October 2nd: W. Blackall. Very abundant at Ramsgate and Margate; last seen September 15th: R. T. Gibbons. Very abundant at Folkestone; seventy-eight captured during September, also *Helice*; one taken on November 4th, very fresh: W. J. Austen. In great numbers round Strood; I know of one thousand five hundred captures, including twelve or fourteen *Helice*; second brood appeared at the end of July; one captured November 2nd: J. Ovenden.

KIRCUDBRIGHTSHIRE.—At Arbigland, on the Galloway coast, I was told by the gardener it outnumbered the common whites: R. Service.

LEICESTERSHIRE.—Very common round Leicester, one was taken in the centre of the town itself; first seen June 9th, three taken in the month; not seen in July; fifty-seven *Edusa* and

one *Helice* taken in August; thirty *Edusa* and two *Helice* taken in September; last seen September 24th: J. T. Elkington.

MIDDLESEX.—Nine seen on May 23rd, ?at Hampstead: L. Fox. Very abundant, in August and the beginning of September, on the marshes and railway banks near Lea Bridge: C. J. Biggs.

OXFORDSHIRE.—Near Woodstock, in August: C. L. Adams.

NORFOLK.—Excessively abundant; taken at Costessey, end of May; plentiful throughout August from Norwich to South Walsham; also plentiful at Cromer, on the coast; I have only heard of one *Helice*, which was taken at Norwich; last seen, October 5th: R. Laddiman.

SHROPSHIRE.—Several taken at Walford, near Shrewsbury, June, September, and October 14th: C. L. Adams.

SOMERSET.—Abundant at Castle Cary; last seen, September 22nd; W. Macmillan. One seen, October 5th; and another, October 24th: W. J. Allen.

STAFFORDSHIRE.—In North Staffordshire in June and August: Rev. T. W. Daltry.

SUFFOLK.—Plentiful at Lowestoft: R. Laddiman. Common at Clacton-on-Sea to September 28th; I saw a lively male at Ipswich on October 20th: H. Miller, jun.

SURREY.—New Malden; first seen June 3rd, abundant by 11th; second brood, first seen, July 29th; in enormous numbers from then to August 21st; one *Helice* taken: H. T. Dobson, jun.

SUSSEX.—Several, in fine condition, on June 4th, at Eastbourne; of this early brood I know of four captures of *Helice*; second brood, first noticed on July 30th; of this brood I have captured several *Helice*; last seen, October 3rd: G. F. Gottwaltz. Very common, near St. Leonard's, from June 3rd to October 19th, when it was still in good condition; many *Helice* seen and taken, commoner the first part of the season: E. K. Robinson. For Miss R. M. Sotheby's Hastings record, see *infra*.

YORKSHIRE.—A male seen on June 3rd, in York; no more seen till the end of August; August and September several taken; last seen, September 29th: T. Wilson. Several, near Driffield, in September; last taken, September 27th: G. R. Dawson. On September 28th, near Sheffield: W. Sheldon. I saw *Edusa* on September 28th: W. Simmons. Several taken near Leeds: C. Smethurst.

Many of the above contributors speak of the preponderance

of males in the early part of the flight-time, and of the females later. The total absence of *C. Hyale* is also noticed by several. Very many other occurrences have come to my knowledge privately, but they are not included, as the distribution has been general, extending from Orkney (W. Tait) to Land's End (H. Miller), and from Pembroke (C. G. Barrett, in E. M. M.) to Lowestoft (R. Laddiman). The above, together with the records of the early appearances, which are tabulated in the July and August issues (Entom. x. 187, 209), are ample to show the comparative earliest and latest dates; also the occurrence of *Helice*. The comparative absence of life-history notes is to be regretted. If the collectors, who now boast of their one, two, or even three thousand specimens, had set apart but one day to the obtaining of eggs, it is evident that both themselves and their favourite Science and pursuit would have been benefited and rewarded. What 1877—the great *Edusa* year—lacked, 1878 should have been able to make good. From the number of specimens taken there certainly ought to be ample materials for a continuation of the species in entomologists' hands, either as eggs, larvæ, pupæ, or hibernating imagos. *Prudens futuri*. Where are they?

In addition to published notes in the 'Entomologist' (Entom. x. 210, 285), the following relate to life-history:—

I obtained about twenty eggs from two females, about August 5th or 6th. These hatched in about twelve or fourteen days, and fed till October 7th, when one changed to pupa. The others unfortunately died, from some cause not known to me, after the last change of skin. A male *Edusa* emerged from the said pupa on the 2nd of November.

—JOSEPH OVENDEN.

I took a worn female *Edusa* at St. Helen's, Isle of Wight, on September 26th, which I put under a net. In a short time it laid about twenty eggs, and a few more the next day. They were laid on two species of clover, and also on the net, one by one. They have since all collapsed.—H. GOLDING-BIRD.

On September 6th I captured a female, which I pill-boxed, and afterwards placed under a glass cylinder, with a sprig of clover in blossom. On the 13th I found she was dead, and had deposited about fifteen eggs, which commenced to hatch on the 17th. I supplied them with a growing plant of clover, upon which they commenced feeding but very slowly; and I have at the present date one or two larvæ remaining,

which are not more than half an inch in length, the rest having all died.—C. J. BIGGS (October 17, 1877).

Mr. W. H. Harwood had larvæ this autumn, which all died before changing. However, one was feeding as late as December 21st.

My own notes are as follows:—

Wild specimens seen on June 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 15th, 16th, 17th, 18th, 19th, 20th, 28th, 30th; July 2nd, 3rd, 30th, 31st; every day in August but the 10th, 25th, 26th and 27th; September 1st, 7th, 10th, 11th, 17th, 18th, 19th, 22nd, 26th; October 6th, 19th. Allowing for absence from home and other causes this shows almost a continuous occurrence from June 6th to October 19th; the only break being through July. The first female I took on June 6th I confined, with two others taken subsequently, over growing plants of *Trifolium* (var. spp.), *Medicago* (var. spp.), and *Lotus corniculatus*. The first captured female, only, laid eggs. These were deposited, as described in Newman's 'British Butterflies' (p. 144, and see figure), on the trefoil (*Medicago lupulina*), on June 8th, and numbered upwards of two hundred. The eggs hatched on June 14th, and the two first larvæ fixed for changing on July 7th. This operation was completed (visibly) by the 9th. The two first imagos emerged on July 21st. The most accelerated metamorphosis thus occupied forty-three days from the egg-laying, thirty-seven from hatching; and the most prolonged occupied sixty-eight days from the egg-laying. I can speak to this decidedly, as I had not a single dead pupa, neither did I have a cripple emerge, or any semblance of a variety. The brood, I am afraid, was kept much too natural for this. The record of emergence is:—July 21st, two males; 22nd, one male; 23rd, five males; 24th, four males and three females; 25th, five males and four females; 26th, one male and six females; 27th, four males and twelve females; 28th, two males and six females; 29th, four males and three females; 30th, three males and three females; 31st, five males and five females. August 1st, four males and three females; 2nd, one male and two females (fourteen pupæ distributed); 3rd, two males and one female (four pupæ distributed); 4th, one male and two females; 5th, one male; 6th, one male and two females; 7th, one male; 8th, two males and two females; 9th, one female; 11th, one female; 15th, one female. In all, forty-nine males and fifty-seven females. On the 27th July I put some of these bred pairs under various cages in a lucerne

field, the "bottom" of which was thick white clover (*Trifolium repens*) on bloom. Eggs were deposited by the 29th, and plentifully on the 30th. On August 7th I first noticed the young larvæ; they then swarmed. I occasionally looked at them from time to time, and all went well till August 22nd: the heavy rain on that day, and on the 25th to 27th, decimated them considerably; the cages, which were covered mostly with various materials, from lino to calico, were a hurtful shelter; drying under them was difficult, and almost impossible. However, from this time they were left very much to themselves, and in consequence were preyed upon voraciously by the woodlice (*Oniscidæ*), which swarmed in their cages, and the slugs were by no means their friends. Another time I could manage better; striving to be strictly natural to such a wayward species was the cause of my failure. I had but one of these numerous larvæ turn to a pupa, as far as I could find. On September 24th I found this being devoured by two fat *Onisci*, which I need hardly say were hung, drawn, and quartered on the spot. Mr. Purdey gave me a pair of *Edusa*, which had been taken *in cop.*, at Folkestone, on November 4th. These I endeavoured to keep alive, hoping for eggs; but the female died, November 18th, and the *post mortem* showed her to be quite empty. After a week's absence, on my return home on December 11th, the male was just alive; the next day it died; possibly while its keeper was away it had missed its "drops," of which it used to imbibe most freely.

This—with Miss Sotheby's very full record, which appears below—is the experience of *Edusa* in 1877, one of the wettest and most sunless years remembered for some time, and one in which the honey harvest has been bad, the fruit harvest worse, and the corn harvest the worst known since 1843; insects of all orders were scarce, many noticeable by their almost total absence,—wasps for instance. In such a season, and with the present limited state of our knowledge of *Colias*, it is useless to attempt to assign a cause for its inordinate abundance, and this in one species only. I cannot hear of ten undoubted specimens of *Hyale* being seen, and these, I believe, all occurred in June. Where was the diversity of influence on the two closely-allied species?

In the September 1876 'Entomologist' (ix. 202) I ventured an opinion that *Colias* was double-brooded, and had not a hibernating imago. The prophecy as to its abundance was fulfilled. The enquiry as to its autumn egg-laying was

confirmed (Entom. ix. 256, 257). At the first subsequent opportunity I ventured to solve my own problem, and not without some success. Above I have given a tolerably complete history of two broods.

The year 1877 has taught us that *C. Edusa* is normally double-brooded, and occasionally triple-brooded. But how does it pass the winter? As an egg, as now instanced; as a larva, as related by the Rev. J. Hellins (E. M. M. vi. 232); as a pupa, as related by Mr. C. W. Dale (Id. v. 77); or as an imago, as related by Mr. J. Cranstone (Ent. Intell. ii. 11) and Mr. R. R. Harvie (Id. ix. 179)? This point shall be returned to; but enough has been said to show the necessity of more observers.

Malden, Essex, January 1, 1878.

HASTINGS, 1877.—In August and September last *Colias Edusa* was very abundant in this neighbourhood, and amongst them I was fortunate enough to capture eight of the variety *Helice*, all in a perfect condition, and one of which is of a bright saffron-colour. A friend who was with me at the same time also succeeded in taking six *Helice*. On the 17th of October I captured four, all very perfect; one of them when taken had the empty pupa-case beside it, and its wings were quite hump. On the following day I took another, also with the pupa-shell beside it. The last *Edusa* taken was on the 17th of November, when I left the neighbourhood. This, notwithstanding the lateness of the season. The following is my full record:—August 2nd, seven specimens taken; 3rd, seven; 4th, fourteen; 6th, twelve; 7th, eighteen, and one *Helice*; 8th, fourteen; 9th, nine; 10th, twelve, and one *Helice*; 11th, five; 13th, eight; 14th, eight; 15th, two; 16th, three, *Edusa* eggs laid; 17th, ten; 18th, sixteen; 20th, twenty-six, and one *Helice*; 22nd, *Edusa* larvæ out; 23rd, fifteen; 24th, six, and one *Helice*; 25th, six, and one *Helice*; 30th, five, and one *Helice* (saffron colour). September 1st, eleven, and one *Helice*; 5th, two, and one *Helice*; 6th, thirteen, *Edusa* eggs laid; 7th, four; 11th, four, and two *Edusa* larvæ; 16th, larvæ out; 18th, one nearly full-fed larva taken; 27th, first larva fixed for changing; 29th, three, first larva turned to pupa. October 5th, eight, second larva fixed for changing; 6th, two; 7th, second larva turned to pupa; 9th, two; 10th, four; 11th, eight; 17th, four, one just out, with pupa-shell; 18th, eight,

one just out, with pupa-shell; 20th, seven; 24th, two; 26th, thirteen, twenty-four seen and taken; 28th, five; 30th, three; 31st, seven, ten seen and taken, imperfect. November 1st, nine, nineteen seen and taken; 2nd, four, eggs laid; 3rd, ten, eighteen seen, first pupa showing colour; 5th, fifteen, second pupa showing colour; 6th, first imago out from larva taken September 18th, female; 8th, eight; 10th, one; 13th, five; 16th, second imago out, very small, male; 17th, one; 18th, eggs laid. On the 6th and 7th of August I captured five or six specimens of *C. Edusa*, which I placed in a large band-box covered with muslin, keeping them regularly supplied with fresh lucerne (*Medicago sativa*) and red clover (*Trifolium medium* and *T. pratense*), sprinkled daily with sugar and water. I allowed them as much sun and air as possible; and on the 16th of August the first eggs were laid. They stood upright on the food-plant, as described by Newman, like ninepins, pointed at each end, white in colour, with a faint yellow tinge. On the second day they changed to a rich orange, and afterwards, at an interval of six days, to black, which just before the larvæ emerged had a metallic appearance. This was on the 24th. I fed the young larvæ entirely on lucerne, separating a few to note the changes, which I have endeavoured to describe as accurately as possible. When hatched the larvæ were of a dingy green colour, which they retained until their first moult, which took place on the 2nd of September. They then changed to a bright green, closely resembling the tint of the lucerne leaves. The second moult was on the 11th of September; the third on the 19th; the fourth on the 27th; and the fifth and last on the 7th of October. At the fourth change a white narrow line was plainly visible along each side, having a reddish spot at each of the twelve segments. They did not differ at all at the last change, except that the line and spots became more distinct. Before each moult I noticed the larva attached itself by threads to the leaf. I had about thirty larvæ, which were nearly full-fed, and about eighty others of all sizes; of these, two, which I had taken in the lucerne field, changed to pupæ on September 29th and October 6th, securing themselves before doing so to the lucerne or to the lid of the box, in the same way as the *Pieridæ* do. Unfortunately the others, whose life-history I have recorded, all died before turning to pupæ. —ROSA M. SOTHEY; Sunnyside, Ore Valley, Hastings.

A LIST OF NEW SPECIES OF COLEOPTERA.

WHICH HAVE BEEN ADDED TO THE BRITISH FAUNA DURING THE YEARS 1872 AND 1877 INCLUSIVE, WITH NOTICES OF THE PRINCIPAL CHANGES OF NOMENCLATURE OF OTHERS; BEING A CONTINUATION OF THE CATALOGUE CONTAINED IN THE 'ENTOMOLOGIST'S ANNUAL' OF 1872, UP TO DECEMBER 31, 1877.

By JOHN A. POWER, M.D.

THE abbreviations and arrangements adopted in this list are the following:—

1. The numbered species are insects absolutely new to the British Catalogue, having been discovered independently, or diagnosed from other cognate but known species with which they had previously been mixed up in the collections.

2. The non-numbered species, printed in italics, refer to insects which are supposed to have been inaccurately determined, but have already appeared in the British lists, though under other names, several of them being even advanced to the rank of new species, for reasons stated in the references.

3. The sign * indicates that the insect is almost certainly only an accidental introduction, without any satisfactory history, and has little or no claim to be called British. The sign † indicates that the insect is probably by no means indigenous, but more or less completely naturalised.

4. Mag. is the 'Entomologist's Monthly Magazine,' followed by the volume and page where the notice occurs. An. is the 'Entomologist's Annual,' followed by the year and page of the notice.

5. The name attached to the species is that of its author or describer. The second name is that of the person who first published the insect as British and determined its species, unless otherwise stated. The names following the references are those of the locality of the insect, and of the persons who actually found it.

6. The last number is that of the year in which the publication of the name, or change of name as British, occurred. When the number of known species is very limited, I have noticed it. The arrangement followed is that of Dr. Sharp's Catalogue.

Dromius vactensis, Rye.—E. C. Rye, Mag. x 73, and An., 1874, 76, known and registered as *D. oblitus*, *Boield.*, in

Crotch and Sharp Cat., determined as new species by E. C. Rye. 1873.

1. *Amara continua*, *Thoms.*—E. C. Rye, *Mag.* ii 207, a new species, separated by Thomson from *A. communis*. 1875.

2. *Harpalus quadripunctatus*, *Dej.*—T. Blackburn, *Mag.* x 68, and *An.*, 1874, 78. Braemar, T. Blackburn and G. C. Champion. 1873.

Bembidium 14-striatum, *Thoms.*—E. C. Rye, *Mag.* x 137, and *An.*, 1874, 80 = *B. var. velox*, *Er.* 1873.

Ilybius ænescens, *Thoms.*—E. C. Rye, *Mag.* ix 36, 60, and *An.*, 1873, 22 = *J. angustior*, *Gyll.*, probably. 1872.

3. *Philhydrus suturalis*, *Sharp.*—D. Sharp, *Mag.* ix 153, and *An.*, 1873, 22, a new species, separated by Sharp from *P. marginellus* of collections. 1872.

4. *Helophorus tuberculatus*, *Gyll.*—E. C. Rye, *Mag.* xi 135, 235. Manchester and Scarborough, J. Chappell and T. Wilkinson. 1874.

5. *H. planicollis*, *Thoms.*—T. Blackburn, *Mag.* xiii 39. Ireland and Scotland. 1876.

6. *H. æqualis*, *Thoms.*—T. Blackburn, *Mag.* xiii 39. Ireland and England. 1876.

7. *H. brevicollis*, *Thoms.*—T. Blackburn, *Mag.* xiii 39. Killarney, T. Blackburn. 1876.

8. *H. strigifrons*, *Thoms.*—T. Blackburn, *Mag.* xiii 40. Scotland and Ireland. 1876.

9. *H. laticollis*, *Thoms.*? (*Idæ*, *J. A. Power*, MSS.).—E. C. Rye, *Mag.* xiii 40, is *Heloph. nov. species*, *Sharp Cat.* *J. A. Power*, Woking. 1876.

10. *Leptusa testacea*, *Bris.*—E. C. Rye, *Mag.* ix 5, and *An.*, 1873, 22. Whitstable, G. C. Champion. *One specimen*. 1872.

11. *Aleochara hibernica*, *Rye.*—E. C. Rye, *Mag.* xii 175. Co. Down, Ireland, G. C. Champion. *One specimen*. 1876.

12. *Homalota egregia*, *Rye.*—E. C. Rye, *Mag.* xii 176. Caterham, G. C. Champion. *One specimen*. 1876.

13. *H. difficilis*, *Bris.*—D. Sharp, *Mag.* viii 247, and *An.*, 1873, 23. G. R. Crotch and G. C. Champion. 1872.

14. *H. humeralis*, *Ktz.*—D. Sharp, *Mag.* viii 247, and *An.*, 1873, 23. Cirencester, Dr. McNab. 1872.

15. *H. fimorum*, *Bris.*—D. Sharp, *Mag.* viii 274, and *An.*, 1873, 23. Norfolk, G. R. Crotch. 1872.

16. *H. atrata*, *Man.*—G. C. Champion, *Mag.* viii 247, and *An.*, 1873, 24, determined by D. Sharp. Lee, G. C. Champion. 1872.

* 17. *Leistotrophus cingulatus*, Grav.—Rev. A. Matthews, Mag. xiv 38. Devonshire, Rev. H. Matthews. *One specimen.* North America. 1877.

18. *Scoparus Ryei*, Woll.—T. V. Wollaston, Mag. ix 34, and An., 1873, 24. Slapton, T. V. Wollaston. 1872.

19. *S. subcylindricus*, Scrib.—E. C. Rye, Mag. x 138, and An., 1874, 82. Ascribed to England in 'L'Abeille.' 1873.

20. *Lithocharis picea*, Ktz.—E. C. Rye, Mag. ix 156, and An., 1873, 24. Bexley, G. C. Champion. 1872.

Acidota ferruginea, Er.—E. C. Rye, Mag. ix 190, and An., 1874, 82. Scarborough, R. Lawson, probably is *var.* of *A. cruentata*. 1873.

Bryaxis cotus, De Saulc., &c. (Sharp MSS.).—D. Sharp, Mag. xii 225, is *B. Lefebvrei* of Sharp Cat., returned as a new species by M. de Sauley. 1876.

21. *Euplectus Abeillei*, De Saulc.—D. Sharp, Mag. xii 225, returned as such by M. de Sauley. Mickleham, D. Sharp. *Two specimens.* 1876.

22. *E. piceus*, De Saulc.—D. Sharp, Mag. xii 125, returned as such by M. de Sauley. New Forest, D. Sharp. 1876.

23. *E. Duponti*, Aub.—D. Sharp, Mag. xii 225, returned as such by M. de Sauley. Scarborough, R. Lawson. 1876.

24. *Scydmenus belvolus*, Schaum.—D. Sharp, Mag. xii 225, returned as such by M. de Sauley. 1876.

25. *S. Sharpi*, De Saulc.—D. Sharp, Mag. xii 225, returned as such by M. de Sauley. R. Lawson. 1876.

S. glyptocephalus, De Saulc.—D. Sharp, Mag. xii 225, returned as such by M. de Sauley, is *S. carinatus* of Sharp's Cat. and of List, An., 1872, 165. 1876.

26. *S. prateritus*, Rye.—E. C. Rye, Mag. ix 6, and An., 1873, 25. Croydon and Seaford, on chalk, E. C. Rye and E. Waterhouse. 1872.

Trimium brevicorne, Reich.—D. Sharp, Mag. xii 225, is male of *T. brevipenne*, Chaud., which, therefore, must be omitted. 1876.

27. *Trichopteryx carbonaria*, Matthews.—Rev. A. Matthews, Mag. ix 179. Thoresby, Rev. A. Matthews. *One specimen.* 1873.

28. *Pullum casum*, Er.—Rev. A. Matthews, Mag. ix 179, and An., 1874, 84. Cambridge, Crotch. *P. casum* of former lists is *P. inquilinum*, Er. = *P. myrmecophilum*, All. 1873.

29. *Anisotoma lunicollis*, Rye.—E. C. Rye, Mag. viii 203,

and ix 136, and An., 1873, 25. Lancashire, Scarborough, and Forest Hill, J. A. Power, R. Lawson, Marsh. 1872.

30. *A. brunnea*, *Sturm.*—E. C. Rye, Mag. ix 135, and An., 1873, 26. Scarborough, R. Lawson. 1872.

31. *A. macropus*, *Rye.*—E. C. Rye, Mag. x 133, and An., 1874, 87. Claremont, G. C. Champion. 1873.

32. *A. curta*, *Fair.*—E. C. Rye, Mag. xii 150. Norwich and Esher, Rev. L. Brown and G. C. Champion. *Two specimens.* 1875.

33. *A. clavicornis*, *Rye.*—E. C. Rye, Mag. xii 150. Dumfries, D. Sharp. *One specimen.* 1875.

Hydnobius spinipes, Gyll.—E. C. Rye, Mag. viii 204, and An., 1873, 25, is probably a large *H. strigosus*, *Schm.* 1872.

Colon Barnevillii, Ktz.—E. C. Rye, Mag. xii 177, was returned as such by M. Tournier, but is probably undeveloped form of *C. Zabei*, *Krtz.* 1876.

* 34. *Platysoma oblongum*, *Fab.*—J. Chappell, Mag. xii 62, no doubt accidental. No history. 1875.

35. *Phalacrus Brisouti*, *Rye.*—E. C. Rye, Mag. ix 8, and An., 1873, 26, returned as new by M. Tournier, and described as new species by E. C. Rye. Deal, Lee. 1872.

P. Humbertii (Tournier MSS.).—E. C. Rye, Mag. ix 37, and An., 1873, 27, returned as such by M. Tournier, is probably a small *P. corruscus*, Mag. xii 177. 1872.

Olibrus particeps, Muls.—E. C. Rye, Mag. ix 38, and An., 1873, 27, returned as such by M. Tournier, is *O. affinis* of Sharp's Cat. 1872.

36. *O. helveticus* (Tournier MSS.).—E. C. Rye, Mag. xii 177, returned as such by M. Tournier. Caterham, G. C. Champion. *One specimen.* 1876.

37. *Meligethes ochropus*, *Sturm.*—E. C. Rye, Mag. ix 156, and An., 1873, 28. New Forest and Esher, J. A. Power and E. C. Rye. 1872.

38. *M. incanus*, *Sturm.*—E. C. Rye, Mag. viii 286, and An., 1873, 28. Darenth, G. R. Waterhouse. *One specimen.* 1872.

M. mutabilis, Rosen.—E. C. Rye, Mag. viii 269, according to M. Brisout, = *pictus*, *Rye.* 1872.

† 39. *Silvanus advena*, *Er.*—An., 1874, 88, was introduced in former lists, but afterwards omitted; should be restored, but is certainly only naturalised. 1874.

40. *Cryptophagus subfumatus*, Ktz.—E. C. Rye, Mag. xii 178. G. C. Champion. *One specimen.* 1876.

41. *Atomaria divisa*, Rye.—E. C. Rye, Mag. xii 178. E. C. Rye's collection, no locality. *One specimen*. 1876.
42. *Parnus striatellus*, Fair.—G. Lewis, Mag. xiv 70, returned as such by M. Kiesenwetter. Norwich and Horsell, J. A. Power. 1877.
- Geotrupes stercorarius*, L.—An., 1874, 93, = *G. putridarius* of Erichson and Sharp's Cat. 1874.
- G. spiniger*, Marsh.—An., 1874, 93, = *mesoleius*, Thoms., = *stercorarius*, Er., and of Sharp's Cat. 1874.
- Trachys pumilus*, Ill.—G. C. Champion, Mag. xii 226, = *T. nanus*, F., of Sharp's Cat. 1876.
43. *Cardiophorus rufipes*, Fourc.—G. C. Champion, Mag. xii 227. Renfrewshire, Mr. Dunsmore. *One specimen*. 1877.
- Cyphon pallidiventris*, Thoms.—D. Sharp, Mag. ix 154, = female *C. nitidulus*, Thoms. 1872.
- C. punctipennis*, Sharp.—D. Sharp, Mag. ix 155, and An., 1873, 29, = *C. nigriceps* of Sharp's Cat., and of An., 1872, 181. Erected into a new species. 1872.
- ‡ 44. *Pinus testaceus*, Ol.—D. Sharp, Mag. ix 268, and An., 1874, 97, no doubt introduced. 1873.
- ‡ 45. *Tribolium confusum*, Duv.—D. Sharp, Mag. ix 268, and An., 1874, 98, no doubt introduced. 1873.
46. *Abdera triguttata*, Gyll.—G. C. Champion, Mag. xi 63. Aviemore, G. C. Champion. 1874.
- Anthicus Scoticus*, Rye.—E. C. Rye, Mag. ix 10, and An., 1873, 29, is the *Anthicus* determined by E. C. Rye as *A. flavipes*, Panz. An., 1868, 1870, and 1872, 185, but now made a new species. Loch Leven, J. A. Power and E. Waterhouse. 1872.
- Meloe cyaneus*, Muls.—E. C. Rye, Mag. viii 248, 288, also An., 1873, 30, is probably *M. proscarabæus*, var. 1872.
- Otiorhynchus blandus*, Schön.—D. Sharp, Mag. ix 290, and An., 1874, 100, is *O. monticola* of Sharp's Cat. 1873.
47. *Cathormiocerus maritimus* (Moncreaff MSS.).—E. C. Rye, Mag. x 176, is *Cathormiocerus spec.*, Rye, An., 1871, 21. 1874.
48. *Liocorus troglodytes*, Rye.—E. C. Rye, Mag. x 136, and An., 1874, 103. Faversham, J. Walker. *Two specimens*. 1873.
49. *L. oblongulus*, Boh.—E. C. Rye, Mag. ix 242, and x 138; also An., 1874, 102. Chatham and Caterham, J. Walker and G. C. Champion. 1873.
50. *Bagous brevis*, Gyll.—E. C. Rye, Mag. ix 242, and An., 1874, 103. Horsell, J. A. Power. 1873.

51. *Smicromyx Reichei*, *Gyll.*—E. C. Rye, *Mag.* ix 11, and *An.*, 1873, 30. Folkestone, E. Waterhouse, *Two specimens.* 1872.

52. *Orchestes semirufus*, *Gyll.*—E. C. Rye, *Mag.* x 18, and *An.*, 1874, 105. Stated in *An.*, 1872, 189, to be erroneously inserted in British list. Weybridge, S. Stevens. 1873.

53. *Nanophyes gracilis*, *Redt.*—E. C. Rye, *Mag.* ix 157, and *An.*, 1873, 31, = *N. geniculatus*, *Aub.* Esher, New Forest, Horsell, E. C. Rye, G. C. Champion, J. A. Power. 1872.

Cossonus ferrugineus, *Clair.*—T. V. Wollaston, *Mag.* ix 243, and *An.*, 1874, 109, is *C. linearis*, *L.*, of Sharp's *Cat.* 1873.

54. *Apion opeticum*, *Bach.*—E. C. Rye, *Mag.* xi 156. Hastings, J. A. Power. *Two specimens, male and female.* 1874.

Bruchus atomarius, *L.*, Thoms.—Rev. H. Gorham, *Mag.* ix 191, and *An.*, 1874, 110, is *B. seminarius* of Sharp's *Cat.* 1873.

B. lathyri, *Kirby.*—E. C. Rye, *An.*, 1874, 110, and *Mag.* ix 191, is *B. loti* of Sharp's *Cat.* = *B. oxytropis*, *Geble?* 1873.

* 55. *Clytus erythrocephalus*, *Fab.*—E. C. Rye, *Mag.* ix 215, 268, also *An.*, 1874, 112. Middleton, Mr. Thorpe. *One specimen*, certainly accidental. American. 1873.

* 56. *Agapanthia micans*, *Panz.*—E. C. Rye, *Mag.* ix 190, and *An.*, 1872, 112, in E. C. Rye's collection. *One specimen.* No history. Probably accidental. 1873.

57. *Pachyta sexmaculata*, *Lin.*—G. C. Champion, *Mag.* xiv 92. Aviemore, Mrs. King. *Two specimens.* 1877.

58. *Thyamis distinguenda*, *Rye.*—E. C. Rye, *Mag.* ix 157. Mickleham and Boxhill, E. C. Rye and G. C. Champion. 1872.

Psylliodes instabilis, *Foud.*—E. C. Rye, *Mag.* xii 180, probably is *P. picipes* of Waterh. *Cat.*, and *An. List*, 1872, 200, and *An.*, 1873, 33. Corroborated by M. Allard. 1876.

59. *Scymnus arcuatus*, *Rossi.*—T. V. Wollaston, *Mag.* ix 117. Shenton, T. V. Wollaston. *One specimen.* 1872.

In making out this list I have searched through the 'Entomologist's Monthly Magazine,' the 'Entomologist's Annual,' the 'Entomologist,' the 'Scottish Naturalist,' and the Transactions of the Entomological Society of the last six

years, and thus obtain eighty-three notices. Of these, twenty-four are changes, or corrections, of names which were previously in our catalogues; and fifty-nine refer to insects absolutely new to our list. Of these, however, two ought to be excluded, as referring to merely single specimens of undoubtedly American insects, viz., *Leistotrophus cingulatus* and *Clytus erythrocephalus*; and two others, as relating to single specimens of insects known as foreigners, but without any trustworthy British history, viz., *Platysoma oblongum* and *Agapanthia micans*. Again, three others are undoubtedly to be considered as merely introduced, and scarcely naturalised, and as having no claim to be supposed British insects proper, viz., *Silvanus advena*, *Plinus testaceus*, and *Tribolium confusum*. We have, thus, fifty-two for the absolute number of genuine additions in six years, and it is not improbable that a few of these will be ultimately reduced; new species having in several cases been founded on single specimens, or by the separation of insects which had been previously grouped under one name; the differences being occasionally not of a very decided character, and some of them possibly merely sexual. Thus two species of *Trimium* have been reduced into one, as representing only the sexes; and *Meligethes palmatus*, Er., is identical with *M. obscurus*, Er., on the same grounds. We thus obtain an average of not quite nine, for each of the last six years; a great contrast to that of fifty-five, as recorded for the previous seventeen years, in the list of the 'Entomologist's Annual' of 1872. This would seem to indicate either that the new species are becoming pretty well worked out, or that there has been a great lull in collecting activity, which I suspect is the case.

The only name which stands out prominently is that of that indefatigable collector Mr. Champion, assisted by his friend Mr. Walker; Mr. Lawson has done much. Mr. Crotch and old Turner are, alas, lost to us; Dr. Sharp and Mr. Gorham have ceased to give much exclusive attention to British insects; Mr. Rye has now little or no time for personal collecting. All of these are men who used to add largely to our discoveries, and they have not yet been replaced.

If we analyse our Catalogues we shall find that in

1872	there were	18	new insects,	and	9	changes of name.
1873	"	13	"	"	7	"
1874	"	5	"	"	2	"
1875	"	4	"	"	0	"
1876	"	15	"	"	6	"
1877	"	4	"	"	0	"

It would seem then, that there have been slight outbursts of British energy in the years 1872, 1873, and 1876; but during the last year a state of almost absolute stagnation.

There must be a wide field of discovery yet open in Ireland, the northern parts of Scotland, and even in Wales, which are almost unexplored in comparison with the more populous districts of England; and let us hope that at the end of another six years we shall have to record a revival of entomological ardour, and a large increase in our averages. It will be observed that the determinations have been made principally by Mr. Rye or Dr. Sharp, whose critical acumen, and extensive entomological knowledge and experience, has rendered them the almost universal referees of less accomplished British coleopterists, or of those who have not access to the books, &c., necessary for identifying the novelties which they recognise as the result of their collecting.

52, Burton Crescent, January, 1878.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LEUCOPHASIA SINAPIS AT REST.—With reference to *Leucophasia sinapis* the late Mr. Newman used to say that it had never been observed at rest. On the 5th of August, in Stubby Copse, I touched with a stick what I thought to be a bleached specimen of *Pseudopterpna cytisaria* at rest on some stunted grasses in one of the ridings. It turned out to be rather a dull specimen of *L. sinapis*, resting with the wings brought down to the sides, in this respect resembling no other butterfly with which I am acquainted.—H. WHITTLE; 20, Cambridge Terrace, Lupus Street, S.W., Feb. 12, 1878.

ACRONYCTA MYRICÆ.—Guenée described *Montivaga* as a variety of *Acronycta euphorbiæ*, and *A. myricæ* as a distinct species, and my specimens so far agree with him that my *Montivaga* are all lighter than *A. myricæ*; nevertheless it has long been supposed that *A. myricæ* is merely the dark insular form of *A. euphorbiæ*, and Dr. Staudinger has already noted the supposition in his Cat. Lep. Europ. of 1871; but he does not even yet say that the identity has been proved by breeding; and until this is done it must, in such a family as the *Acronyctidæ*, remain matter of doubt.—N. F. DOBREE; Beverley, February 4, 1878.

ZYGÆNA FILIPENDULÆ DOUBLE-BROODED.—Having never before met with a second brood of *Zygæna filipendulæ* in this country, I think it may be worth recording that I took

four specimens of this insect on the 26th of September last, on the hills near Reigate. They were all perfectly fresh, and sitting on the blades of grass, upon which hung the pupa-cases from which they had just emerged. These specimens are very much smaller than those of the summer brood, and the spots show a tendency to coalesce, as in *Z. trifolii*. Besides the specimens captured I saw another pair *in situ*.—HENRY CHARLES LANG; Thurlow Lodge, Golden Manor, Hanwell, W., January 21, 1878.

DICYCLA OO, &c., ON WIMBLEDON COMMON.—Of this generally considered local insect I took a very fine specimen at sugar, on the 4th of July last year. On the same night I took about twenty *Dipterygia pinastri*. This was the only really good night's sugaring I had during the season. Amongst other noteworthy captures made at the same place during the year I may mention *Grapholita minutana* (about a dozen nice specimens), *Pædisca oppressana*, and *P. ophthalmicana*.—H. WHITTLE; 20, Cambridge Terrace, Lupus Street, S.W., February 12, 1878.

CAMPTOGRAMMA FLUVIATA.—I first took this species near Battle, flying along a ditch under a hedge at dusk. My brother also captured one in exactly the same way the next night; this was the end of August. The next was captured by means of a lantern upon heather, at Rake, a village four miles from Petersfield, on September 10th: this was a black female, with a very distinct reddish band (var. *Gemmaria*). I again met with it at St. Leonard's, on October 21st, in a damp ditch amongst willow.—E. K. ROBINSON; Quebec House, St. Leonard's, October 19, 1877.

EPHIPPIPHORA RAYULANA.—Last June I met with four examples of this rare species in Tilgate Forest. *Eupæcilia ambiguana* appears to have quite disappeared from the copse where I found it some ten years ago.—E. G. MEEK; 56, Brompton Road, S.W.

EUPÆCILIA CURVISTRIGANA.—While staying at Folkestone last August I captured a very fine series of this beautiful species. I had not seen it alive since 1866, when I met with a couple of specimens in a wood in North Devon. It may be imagined how pleased I was to find my old friend in a new locality.—ID.

CAPTURES IN IRELAND IN 1877.—My first visit to the willows was on the 2nd of April, when I took a specimen each of *Trachea piniperda* and *Taniocampa miniosa*. Subsequent search for these insects resulted in the capture of

nineteen *T. miniosa* and twelve *T. piniperda*. On the 5th of July I took from a spider's-web a fine female *Lithosia quadra*; it was then alive. So far as I am aware this is the first Irish record of these three species.—W. TALBOT; Ashford, Co. Wicklow.

THE BRITISH HEMIPTERA-HOMOPTERA.—I must quarrel with my friend Douglas's expression, "deterrent remarks," as applied to what I said in my observations upon the *Homoptera* in the little list which I gave of Irish insects in the January number of the 'Entomologist.' I intended to be anything but "deterrent," and hoped, on the contrary, by what I said to incite a large number of collectors to work at this most interesting, but neglected, group, by showing that in it there is a much more extensive field open to new discoveries than in any other. Assuming that there are one hundred workers at *Coleoptera* I doubt whether there would be twenty who attack the *Hemiptera* and *five* who *touch* the *Homoptera*, exquisitely beautiful and interesting as they are. The field of discovery must, therefore, be very great, and a large number of indigenous species must be yet unknown; and indeed every year many new ones are added, far more than in other groups. I did not mean to say that either catalogues or descriptions of *Homoptera* are *wanting*, as far as we can go; but I do think that in the present state of our knowledge any catalogue of a year ago must be even now unsatisfactory, and that its authoritative publication would be premature. It is certainly true that first catalogues can never stand, and soon become obsolete after the additional investigation which they excite, *vide* the changes introduced by Messrs. Crotch and Sharp upon Mr. Waterhouse's Catalogue of *Coleoptera*, which was a grand work of its kind, and a splendid pioneer; *vide* also the original Catalogues of *Hemiptera* of Messrs. Scott and Douglas, as revised by Mr. E. Saunders, and indeed themselves. As to descriptions of the *Homoptera* those of the species known up to the period alluded to may certainly be worked out from the various numbers of the Ent. Mo. Mag., Entomological Society's Transactions, and from the publications of the Ray Society, emanating chiefly from Messrs. Douglas and Scott, and partly from Mr. Marshall; but to these three have been continual additions; and I do not think that we homopterists shall be satisfied until we get them all put together in a new Douglas and Scott volume, which I hope will by-and-bye appear under the auspices of the Ray

Society. And I do sincerely trust that, in working up this favourite group of mine, they will obtain large additional assistance from all quarters, which must bring in a great number of new species, without anyone being "deterred" by my remarks.—JOHN A. POWER; 52, Burton Crescent, February 13. 1878.

INJURIOUS INSECTS.—We are glad to be enabled to state that the plan of recording observations relative to the best means of counteracting the attacks of injurious insects, to which attention was drawn in a pamphlet published in June last (see "Practical Entomology," Entom. x. 166), has been acted on far more successfully than could have been hoped for on a first trial. Practical observers, both in England and Scotland, have come forward, and some useful information has already been gained. This is embodied in a Report recently published for the observers, which, at the request of the promoters of the plan, will be furnished gratuitously to applicants (with sheets for entry of observations, and the original pamphlet of notes for points to be observed) by Mr. T. P. Newman, 32, Botolph Lane, Eastcheap, E.C. Assistance has already been promised for the coming season; and any observations which may be kindly furnished by practical entomologists and agriculturists will be a valuable aid, and gratefully received for incorporation in the next Report.—ED.

NATIONAL ENTOMOLOGICAL EXHIBITION.—We would draw our readers' attention to the Exhibition which will open on Saturday, March 9th, at the Royal Aquarium, Westminster. The applications for space already received far exceed the most sanguine expectations. All orders of insects will be represented in collections varying in size from one insect to sixty cabinet drawers. This, the first general entomological exhibition ever held, will afford a good opportunity for students to compare notes and extend their knowledge. The fauna of almost every part of the United Kingdom will be represented, typical collections having been entered from remote districts. The last day for receiving applications for exhibition space will be Thursday, March 7th; so we would urge intending exhibitors to lose no time.—ED.

THE DOUBLEDAY COLLECTION.—This valuable collection of *Lepidoptera*, still deposited at the Bethnal Green Museum, was specially consulted by 1492 visitors during 1877.—ED.

THE ENTOMOLOGIST.

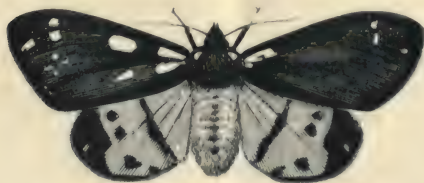
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APRIL, 1878.

[No. 179.]

OBSERVATIONS ON A VARIETY OF CHELONIA VILLICA.

By H. Goss, F.L.S., F.Z.S., &c.



VARIETY OF CHELONIA VILLICA (female).

THE specimen of *Chelonia villica* figured above was bred by Mr. Ambrose Gates, of Brighton, in the spring of 1872. The peculiarities of the insect are so accurately represented in the figure that their description is almost superfluous. In the fore wings the majority of the usual cream-coloured spots are suffused with black, and others are totally obliterated; no trace of them can be detected, even when the insect is held up to a strong light. As shown in the woodcut, the suffusion or obliteration of the cream-coloured spots on the *right* fore wing is much more complete than in the *left* fore wing; and, with the exception of the basal spot nearest the costa and three minute spots near the tip, not the slightest trace of cream-colour is to be found in it. In the *left* wing, in addition to both the basal spots and three small spots near the tip, there is a large spot between the centre of the wing and the costa, a small cuneiform spot between that last mentioned and the inner margin, and some slight traces of the large spot which in ordinary specimens of this species is situated near the anal angle. In the hind wings the only peculiarity is the confluence of certain spots near the centre, so as to form a black streak, extending

completely across the wings. This last-mentioned variation is, however, not uncommon; and I possess several specimens of *C. villica* with a similar streak in the hind wings.

It is difficult to offer any reasonable conjecture as to what may have been the "exciting cause," as Dr. Buchanan White terms it (*Ent. Mo. Mag.* xiii. 148), of such an aberration as the above from the ordinary form of the species. The larva which produced this specimen was obtained, with several dozen other larvæ of the same species, from one locality, near Brighton, and was fed up with them, on the same food-plants, in one breeding-cage. It was, therefore, subjected to the same conditions as to nutriment, light, humidity, and temperature, as the others, not one of which, however, produced any noticeable aberration from the type of the species.

Having regard to these facts, I am inclined to think that the colorational peculiarities of this specimen must be considered as the result of a diseased condition of its larva; they cannot be attributed to causes similar to those* constantly operating in certain districts, in the production of melanic or melanochoic forms; nor to any special conditions of food, light, or temperature, to which, in any locality, a larva in a state of nature may, under peculiar circumstances, be subjected.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. VII. NYMPHALIDÆ—ACRÆINÆ.

THE *Acraeinae* are a rather small group of long-winged butterflies, generally of some shade of fulvous, with black spots, or black, with white or yellowish markings, and the hind wings beneath either striated, or spotted with black at the base. The fore wings are partially transparent in some species. The palpi of the imago are thick and scantily clothed with hair, and the larvæ are spiny. The genus *Acraea*, as it stands, is too extensive, but it cannot yet be satisfactorily subdivided, though we may retain the name *Actinote*, Hübn., for the South American section, with

* *I.e.*, the geological formation of a district, and the nature of its mineral productions (if any); its geographical position, and the prevailing character of its climate and vegetation.—H. G.

striated hind wings, and *Alæna*, Boisd., for the smallest of the African species.

The typical genus, *Acræa*, Fabr., is exclusively African, if we except a very few Indo- and Austro-Malayan species. In the first section, to which belongs *A. Horta*, Linn., the type of the genus, the fore wings are more or less transparent, and the hind wings and base of the fore wings are of some yellowish or reddish shade, varying from pale tawny to red, with numerous black spots, or a macular band. In some species the hind wings are creamy white, as in the Australian *A. Andromacha*, Fabr., which has some resemblance to *Eurycus Cressida*, an insect allied to *Parnassius*, and likewise a native of Australia.

The next section contains a great number of closely-allied species or varieties of considerable size, none measuring less than two inches across, and some nearly four. They are dark brown, with the veins of the hind wings strongly marked. The fore wings are banded or spotted with red, white, or pale yellow; and the hind wings have a band of the same colour, which is often broad enough to cover almost the whole of the wing. *A. Euryta*, Linn., may be considered the type of this group.

In the next group, comprising *A. Zetes*, L., and its allies, the wings are smoky black, with very large spots both above and below, and the fore wings are slightly transparent, often with a short whitish or yellowish transverse band near the tip. The males have a submarginal reddish band, varying in breadth, on the hind wings.

The next group (*Telchinia*) comprises the bulk of the smaller species, measuring from one inch and a half to two inches and a half across; and many of them have a superficial resemblance to Fritillaries. They are generally reddish or tawny, with numerous black spots or dots, and the borders are black, often spotted with yellow on the hind wings. In some species, as in *A. Serena* and *Eponina*, Cram., the tip of the fore wings is more or less broadly black, with a transverse whitish or tawny stripe; and in the latter the base of the hind wings and part of the inner margin of the fore wings is also black. One species of this group, *A. Violæ*, F., is common in Northern India; the others are African.

The next group (*Pareba*) only includes one North Indian species, *A. Vesta*, Fabr. It is a long-winged, yellowish tawny insect, with dark borders spotted with yellow. In the female the veins are strongly marked, and the tawny portion

of the fore wings is broken into spots by the veins, and by transverse dusky markings. There are no black spots at the base.

The genus *Alena* only comprises two little species from Central and Southern Africa, which do not expand much more than an inch at the outside. *A. Amazoula*, Boisd., from Natal, is taken flying among long grass, like a skipper, which it also resembles in coloration, being brown, with a row of elongated tawny spots on the hind margins, and longer ones running from the bases and inner margins of the wings; the under side is more uniformly yellowish, paler, and divided by the nervures, but there are no black spots.

The South American genus *Actinote*, which is likewise destitute of basal spots, and in which the hind wings are always very distinctly striated, at least on the under surface, may be divided into two groups. In the first, represented by *A. Thalia*, L., the fore wings are brown, tawny, yellowish, or reddish at the base and inner margin, more or less divided into spots by the veins, and with a transverse paler band near the tip; the hind wings are of the same colour as the base of the fore wings, divided by the nervures, and often by intermediate black lines, with a rather broad, black hind margin. *A. Thalia*, being apparently a protected species, is mimicked by several other *Lepidoptera*, among which is a *Dismorphia* (*Pierinae*) and a *Castnia* (a moth). In the second group the wings are bluish black, and the hind wings are unspotted above, though with short diverging yellow streaks at the base beneath in several species; the fore wings have the centre of the wings pink or red, the colour generally extending to the base, and there is sometimes a transverse band of the same colour beyond the red portion. In *A. Neleus*, Latr., the red basal portion of the other species is replaced with a shade of blue, rather paler than the ground colour, but, on the other hand, the abdomen is reddish. In *A. Leucomelas*, Bates, the fore wings are bluish black, with two or three long yellowish streaks placed obliquely at the extremity of the cell.

NOTES ON ARCTIA LUBRICIPEDA.*

By EDWIN BIRCHALL, F.L.S.

THE larva occurs in great profusion in the Isle of Man, but I have met with comparatively few of the perfect insect; and in order to learn whether this scarcity was real or only

* Read before the Lancashire and Cheshire Entomological Society.

apparent I captured 500 nearly full-grown larvæ in August, 1867. It would have been easy to have taken 1000.

There are two varieties of the caterpillar: one whitish, with gray hairs; the other yellowish, with red-brown hairs, sometimes so red as to remind one of the caterpillar of *Arctia fuliginosa*. The gray variety occurs in the proportion of four to one of the red. The colour does not indicate sexual distinction.

Larvæ captured, 500. Moths bred—perfect 106, crippled 20 (males 70, females 56); died in larva state, some partially changed to pupa, 90; died in pupa, 84; produced *Tachina cæsia*, 164; produced small ichneumon, 2; unaccounted for (escaped, or possibly thrown out with old food), 34 = 500.

If it may be assumed that no increase in the number of the perfect insect takes place under ordinary circumstances from year to year in a given locality, my 126 moths must be the final produce of a similar number of moths of the previous year, say 60 of each sex; and as each female of *Arctia lubricipeda* lays on the average 150 eggs (as was the case where I counted half a dozen lots), it will result that, of the 9000 larvæ produced by the 60 female moths of 1876, only 500, or $5\frac{1}{2}$ per cent., became full-grown caterpillars, and 106, little over 1 per cent., perfect moths, leaving, if we count the cripples, the enormous number of 8874 larvæ, or 99 per cent., to have perished at various stages of growth. Terrible as it seems this is no exceptional case; the vast over-production and early destruction of life is the rule throughout Creation: life seems to be the most worthless thing which God makes, if we may judge from the base uses to which it is put. Proud man himself is no exception to the universal laws, though he may mitigate its force. Of 800,000 children born every year in Great Britain, 120,000 die in the first year; and in London one-fourth of all children born die before they are a month old. (See Sir Charles Lyell's 'Antiquity of Man,' p. 503.)

This, although awful to contemplate, is no doubt a much smaller rate of mortality than in the case of *Lubricipeda*; but man has not yet reached the point where his increase is checked by the impossibility of finding food or unoccupied space. His time will doubtless come; but so far as present experience goes the process of thinning his race by overcrowding or starvation is not a promising one, either for the improvement of the breed or the evolution of a higher form, although it may be dignified by the name of Natural Selection.

It is difficult to specify the causes of the heavy mortality amongst larvæ, especially in the case of *Lubricipeda*, which appears to be a protected species, and has thus become one of our most abundant and widely-distributed moths. Being polyphagous it can rarely suffer from want of food. When young they feed in companies; and both the eggs and the young broods are probably swallowed wholesale by browsing animals. Nature seems to think it no waste to sacrifice a thousand of their lives to feed a donkey; possibly the young caterpillars give a relish to his dock-leaf.

I do not know whether small birds dislike the young larvæ, but when fully grown it is, with other hairy caterpillars, distasteful to many birds, and seems to walk the paths and climb the walls unmolested. Whether the dislike of these caterpillars evinced by birds is owing to some disagreeable taste or smell, or to their hairy coats, seems doubtful. When thrown to domestic fowls I notice that in the first rush to secure a share of what they probably think is a distribution of ordinary food, the young birds will generally swallow a few; but as soon as the excitement is over, and they take time for a preliminary peck, young and old alike refuse them. There does not appear to be any mechanical difficulty in swallowing the hairy caterpillar, but it is difficult to connect the sense of taste with the horny bill of a bird.

I timed the speed of locomotion in many of these larvæ, and upon a table covered with woollen cloth found it to be about three yards per minute. Why they are in such a hurry is puzzling, seeing that birds will not touch them, and their insect foes have no need to hunt them, as they feed openly, and are always to be had at dinner-time when wanted. There is a curious and, may I not say, singularly human aspect in the contrast between the hurrying caterpillar on the foot-way, and its stupid, gluttonous habit as soon as it finds its food. The activity of a lepidopterous insect seems to be often concentrated in one period of its existence: the agile soaring butterfly is developed from the most sluggish of larvæ; the torpid *Arctia* from very race-horses of caterpillars. The great excess of dipterous parasites is a noticeable fact, the proportion being as 82 to 1 hymenopterous.

I have often seen the large black *Tachina casia* to all appearance idly sunning itself on the nettles and docks where I found *Lubricipeda*, without a suspicion of its motives; and it is a useful lesson to learn from day to day how much is going on around us, before our very eyes, to

which we are blind; what tragedies are incessantly acting in every bunch of nettles, almost under every grain of sand. In no case did I find more than one parasite in a larva.

The moth, I need hardly say, is variable in the size and disposition of the dark spots on its wings; but out of my 126 specimens not one presented any very striking variation from the ordinary type. As the struggle for life must be desperate, when only 1 in 75 can win, and the issue must hang on very minute and seemingly unimportant circumstances, I conclude that the colours of the moth do not in this case count for much in the race.

I incline, however, to think that the red caterpillar is in some way weaker, or more exposed to attack, than the gray form; not only are the gray caterpillars much more numerous, but the proportion of moths produced by the red variety is much smaller.

Douglas, Isle of Man, December 25, 1877.

ENTOMOLOGICAL RAMBLES, 1877.

By J. B. HODGKINSON.

(Continued from p. 31.)

JULY.

THIS should have been the great Tortrix month, but I had poor hopes of much luck, seeing that there were so few larvæ in June. Still I rambled away as usual, thinking that if there were no moths I could add to my stock of health, which, however, did not require mending; so off I set to Grange the first week to get some *Euchromia rufana*, but, like everything else, not one would stir. I paid several visits, but to no purpose: cold and wet weather still continued; always an umbrella; and trying to find some sheltered place in one of the walks through the wood I took *Sericoris bifasciana* off a Scotch fir, and odd specimens of *Ephippiphora signatana*, as well as *Argyresthia mendicella* from the sloe; in fact I had to make up a bag with almost anything to keep my setting-boards full. Then I turned to the wild cherry tree, and took a lot of *Argyresthia ephippella*, and among the agrimony I found a few larvæ of *Nepticula æneofasciella*, but only reared one of the second brood. There is something singular about the second broods of both *Nepticula* and *Lithocolletis*, so very few come out in proportion to those that are in pupa all winter. The second week again off to

Witherslack, expecting to take *Eupæcilia Manniana* and *Tinea albipunctella*, but as usual I spent several days, and nights too, without success. The best time for many *Eupæciliæ* is, I may say, just after dark, but we were often starved out and disgusted with promenading the spot over and over again without result; an odd *Macaria alternata* and *Emmelesia alchemillata* were the only *Geometræ* worth catching; yes, there was an April species out, viz., *Cidaria suffumata*. Next, Mr. Threlfall and I agreed to try for *Elachista serricornella* on the moss, the usual time being about the 12th: here, again, nothing stirring; one or two *E. rhyncosporella*, which should have been in hundreds. We spent during the month several days and nights, at all hours, trying for *E. serricornella*. Mr. Threlfall got up one morning at four o'clock to see if there was anything so early on the moss: his report was more *Carsia imbutaria*, *Hyria auroraria*, *Mixodia Schulziana*, &c., flying about than during the day or evening. However, even this catch was neutralised by the heavy dew, for he came back to breakfast wet through above the knees, and his net became useless after a stroke or two; so this new effort had to be given up. On some odd days we got a bit of sweeping done, and got *Adela minimellus*, *Gelechia atrella*, *G. similella*, *G. taniolella*, and *Coleophora Fabriciella*, this species always among the trefoil, still the larva is unknown; and I know always to a yard where the moth occurs, but cannot yet find it. During the last week I only took three *Elachista serricornella*, but Mr. Threlfall had better luck than I had. Of *Schrankia turfosalis* I could only find an odd one now and then, when my usual catch is one a minute, until I am satisfied. We filled up our time by looking for larvæ of *Depressariæ* on *Pimpinella saxifraga*, and a weary job it was, especially finding *Depressaria capreolella* larvæ; those of *Pimpinella* are easier to find. Several visits to the rocks after *Sciaphila Penziana* only yielded one; in fact, the wind on some occasions was blowing a gale, and in all directions; a sheltered corner was not to be found. During this month I had made up my mind under any circumstances to work out the life-history of *Emmelesia teniata*; here again I was out of my reckoning. I visited Arncliffe, Grange, Witherslack, and Windermere, all localities for this species, and only took two and a half specimens; the half specimen had only two wings, but proving a female she obligingly laid fifteen eggs. I sent them on to Mr.

Buckler. Several hatched, and nibbled away at the enchanter's nightshade, a plant that we have both set down as its probable food. I suggested besides some of the *Hypericums*, as I could see no other likely plants where they occur. The young larvæ seemed to take well to this change. They lived to a certain age, and then died. This is the result of over one thousand miles pilgrimage by rail and legs. However, the latter are not done yet, and I hope to give a better account of *Tæniata* next July.

During the month I paid a visit to my tansy bed to see if some larvæ of *Pterophorus dichrodactylus* had settled down to their new quarters. Mr. Sang kindly sent me some for that purpose. Judge of my mortification when I reached the garden to find a herb gatherer had been and cut them all down; he had given a man in the garden sixpence to do so, whereas I was farming the bed at five shillings per annum. I went after the plants, and found the larvæ letting themselves down from the ceiling. As the tansy had got dried up I had then to fall back on my Michaelmas daisy for a supply of *Dicrorampha tanacetana*; and among the roses in the same garden I got a nice lot of *Spilonota rosæcolana*, the only place I find them down here. Now to Windermere, from the 12th to the 30th, I went about half a dozen times, chiefly to look for *Cidaria reticulata*; and one day it never ceased blowing and raining from morning till night,—a sad blank to four of my children; we could never leave the railway station. Another day it was blowing a furious gale from the north, and I had sent word for a man to come for me with a boat from the other side, near Wray Castle. He had to pull up a long way against the wind to meet me at my place; but the next thing was to get back, which we found utterly impossible, and had to go with the wind, and dodge across at a narrow place from island to island. Then we had to beach the boat and leave it; and I had to walk a long journey before getting to my hunting ground; and as usual the only moths I got were two *Cidaria prunata*. I always take this species when looking for *Reticulata*, but did not see a single specimen of the latter, only those I bred. In fact, I should say it is the most wretched place for moths of any sort. The woods are dense and gloomy, and there are no birds, only an odd jay screeching out now and again. Formerly I used to take *Cidaria olivata* in abundance; of *Tineæ* there are next to none. The best collecting woods are all on the way to Ambleside, close to the station. I heard and saw

many pheasants on the other side of the lake, which rather disturbed the ideas of liberty I had so long enjoyed, never meeting anyone. However, on looking up I saw notices on the trees:—"Trespassers, either nutting or otherwise, will be prosecuted." I soon ascertained there were gamekeepers and watchers, whose acquaintance I had not yet made.

Preston, February, 1878.

(To be continued.)

CONSIDERATIONS ON ABNORMAL GALL-GROWTH.

By E. A. ORMEROD, F.M.S.



Fig. 1.—*CYNIPS KOLLARI*.

THE cause of gall-growth, that is the exact method by which insect oviposition or larval presence causes this peculiar development, is still so far from having been ascertained that any completely abnormal form is of interest, as possibly throwing light on the physiological points involved; and the singular specimen figured above, showing one gall of *Cynips Kollari* formed on the apex of another, differs so completely from any known recorded state of this gall as to be worth notice. This, it will be seen, has no relation to the common double form of *Kollari* galls, in which two, starting growth in juxtaposition, unite by their contiguous sides, but consists of two galls of different dates of growth, and completely distinct (save at the origin of the super-imposed one) from each other. This interesting specimen was found growing near Maldon, by Mr. Fitch, who was good enough to forward it to me for examination.

When gathered the lower of the two galls was mature, hard, and brown, whilst the upper one (then as large as the older one from which it originated) was still young, green, and succulent; this difference in age being still further

shown by the lower and matured gall remaining in its firm condition after being gathered, and the other one shrivelling and contracting, as shown in the figure, the kind of furrow round its base indicating the extent to which the soft tissues have drawn in. A longitudinal section shows each gall to possess a central larval chamber, the internal structure only differing in the parenchyma (or merenchyma) surrounding the harder substance of the cell-wall, which is in its usual state in the lower gall, being shrivelled into a hard mass in the upper one, with the central cell still undeveloped in consequence of its immature state when gathered. What causes may have operated to give rise to this secondary growth it is difficult to conjecture. The presence of the larval cell shows the true gall nature of the growth, and that it is not a simple vegetable excrescence; but the great difficulty lies in the botanical point as to why the parenchymatous tissue should in this case have had the power of throwing out a growth from itself under *Cynips* oviposition, which (if it has occurred before) is at least so unusual as not to have attracted attention.

One explanation (conjecturally) lies in the possible presence of adventitious buds. These, as is well known, may be produced on any part of the normal growths of the tree, and usually where there are stimulating conditions, and an insufficiency of the ordinary buds to carry on the plant action. Should this have occurred nothing further than oviposition would be necessary for the formation of the gall; but the bud presence is very problematical; and a more likely solution suggests itself in abnormal oviposition having taken place in the lowest gall before its formative powers were exhausted, and having caused it to throw out the new growth instead of continuing its own.

It seems to me, however, that in considerations of gall-growth, whether the primary cause lies in injection of fluid, or oval or larval irritation, there is a twofold effect of oviposition to be observed; one producing the larval chamber—the gall proper; and (frequently) a secondary one, which usually gives the gall its characteristic form, but which still preserves its vegetable powers and structure in all essential points, and consequently may be modified by circumstances or state of health of the plant.

These distinct formations may be traced through the stage of division in *Andricus curvator*, where the internal capsule may first be found embedded in a solid cellular mass;

then disengaging itself by process of growth, a few fine shreds of tissue being noticeable drawn across the forming cavity, from the outside of the capsule to the inside of



Fig. 2.—*ANDRICUS CURVATOR*.

the containing hollow chamber, and then separated, this being completely effected in the case noted in about five days (from May 11th to May 16th).

Looking at *Cynips* galls of the oak (as most easily traceable) it appears that one species of *Cynips* causes one special kind of gall, whether the oviposition is on different parts of the tree, or whether several species deposit together in precisely coinciding position and circumstances. We see an example of the former in the well-known currant-gall, formed by *Spathogaster baccharum*, alike on flower-stalks and on leaves;* and of the latter in some of the bud- and bark-galls of the less-known species of *Aphilothrix*, where it appears plainly shown that it is oviposition, not the part of the tree attacked, that affects the characteristic of the gall. The cells of *Aphilothrix corticis* and *A. radialis* may be found in precisely similar circumstances in young bark; *Andricus quadrilineatus* with those at the base of the gall of *A. ramuli* (the woolly-gall); or again in the case of the artichoke-gall (*Aphilothrix gemma*), occurring in the axil of a leaf on a shoot bearing galls of *Cynips Kollari*, and similarly in the axils of the leaves immediately above and below; but with this, although the form of the gall (properly so-called) appears constant, yet there are modifications in what may be called the secondary part.

* Even should the alternation of generation between *Spathogaster baccharum* and *Neuroterus lenticularis*, which Mr. Adler considers to take place, become a proved fact, this would in no way militate against the constant correspondence of the gall and its insect, as under this theory the change of one follows the change of the other.—E. A. O.

We see the two parts (of course only speaking of the species of galls where two parts exist) can carry on life each without the other, and that there is in some cases a chemical difference is shown by galls of *A. radialis* changing colour in the general mass when cut by a steel knife, whilst the section of the cells continues white. In the same species of gall we have the large cellular mass forcing itself rapidly up through the bark from the cambium region beneath, during the flow of sap in the spring, whilst the single-celled form placed in the substance of the young bark simply exists in the shape of detached specimens, this difference no way proving difference in the gall, as may be shown in the cells of the woolly-gall, where some exist single, some double, some in indivisible clusters. In the artichoke-gall we have frequently an abortive form, with the gall-chamber missing, in which the larval action appears to have been interrupted before the formation of the cell, so as only to have given rise to what is botanically an abortive shoot, with its longitudinal growth checked, but the adventitious buds thrown into action in the form of the stunted leaves which compose the scales.



Fig. 3.—*ANDRICUS INFLATOR*.

In *Andricus inflator* we have the inner chamber containing the gall insect, with a clear illustration of simply modified vegetable action in the surrounding shortened shoot, giving rise to its numerous sprays; and in the specimen, whether we consider the two lower cells those of *A. inflator* or *A. curvator*, we have an example of the gall-chamber existing without its characteristic involucreal development, whilst above is a specimen which, when fresh, must have been abnormally swollen even for *A. curvator*, and from which there appears no reason botanically why another gall

should not have sprung. The leaf and petiole in the normal state are capable of throwing out shoots, and in this case there is no apparent change in the general parts of the structure, and if from abnormal stimulus a shoot was thrown out oviposition would give us an abnormal gall, coinciding in many points with the one under consideration of *Cynips Kollari*. However, though this is apparently possible, we have not sufficient knowledge of the structural alterations to admit its probability, and as the very essence of the characteristic of the *Kollari* gall is to lose all trace of its origin in its progress of growth, even should the case have been so, it must rest unproved.

The matter, however, is very interesting as a clue to variations of structure, and some experiments on the results of stimulating or condensing the flow of sap in the early stages of the growth of *Kollari* galls, by ringing, or heading back the shoots, might give us some valuable physiological information.

Judging from experiments with others of the *Cynipidæ*, abnormal oviposition might readily be effected. *Aphilothrix radialis* will oviposit in oak buds in captivity; and on the 13th of December, in the last year, I was fortunate enough to capture two specimens of *Biorhiza aptera* in the very act of ovipositing in the buds of the branches of an old oak at about seven feet from the ground. Being anxious to secure the insects for identification beyond my own examination, I was obliged to draw down the boughs and break off the sprays, but even this did not disturb them, so that in one case I was able to watch the operation for some minutes, and in the other (as I slightly injured the creature in gathering the spray) the ovipositor was just pressed from the bud, with an egg in the act of protrusion. One of the specimens subsequently (as far as could be seen through a fine net) proceeded with oviposition on two buds of an oak in my own garden; and as I have noted the then state of the spray, and isolated it, some curious results may be hoped for.

On examining the buds, amongst which I first found the *Biorhiza* ovipositing, I found one to contain a mass of eggs, similar in their peculiar shape (which is elongated at one end, to a somewhat flask or stalked form), to others which I have taken from the abdomen of *Cynipidæ* on previous occasions. These I have placed, with the bud-scales (which shield them still, though broken from the bud-base), in a small slit made in the bark below the ground level of the same oak in my

garden. At present the outside of the bud is still fresh, and as the contents of the eggs showed indications of the larval presence more than a month ago, I hope that they have progressed so far as to give a prospect of some information as to the effects of larval action on the under-ground bark clearly distinct from those of oviposition.

Dunster Lodge, near Isleworth.
January 24, 1878.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 33.)

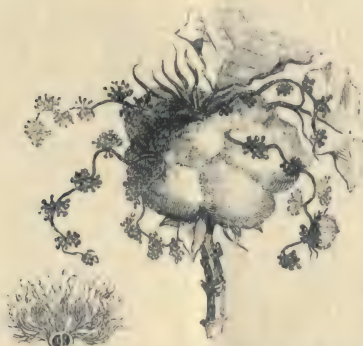


Fig. 81.—Galls of *Andricus ramuli*, and a double gall in section.

81. *Andricus ramuli*, Linné (= *Teras amentorum*, Hart.). —This really small, but almost always compound, gall may be found in May on the catkins of *Quercus pedunculata* or *Q. sessiliflora*, but particularly on *Q. pubescens*. Attached to the catkins we often see nut-sized or smaller woolly masses, which have altogether the appearance of white or brownish yellow cotton-wool rolled together in a ball. If we unroll such a ball it falls into several smaller balls, each of which belongs to a single catkin flower. These smaller balls contain a hard uneven lump in the interior, which is about the size and shape of a millet-seed, hard and brown. Ten to twenty of these grow together on a deformed stalk. Each of these small galls is hard, contains a larva-cell, and is covered with numerous very long hairs, originally sappy, but soon drying: these are matted together and twisted in the same

way as the cotton-seed wool. We sometimes find on a fully developed catkin one or more flowers deformed into a small ball, a single gall surrounded with the hairs. In many cases I have bred *A. ramuli* from these; but last year from such galls, which occurred on *Quercus sessiliflora*, I bred in the third week of May a gall-fly which belonged to another species, and differed from it in having a black head and thorax: the abdomen brown above, yellow below; the antennæ yellow at the base, with the first half brown, and with yellow legs. But still further breeding is necessary in order to acquire more knowledge of it. The yellow gall-flies appear towards the end of May and beginning of June.—G. L. MAYR.

I have had more specimens of this "woolly" or "cotton" gall of the oak sent to me to name than of any other species. It is very widely distributed, and generally common in Britain. It has been recorded from five Scotch counties, the most northern of which are Aberdeen and Inverness-shire. From galls collected on 7th June (1875) the first, *A. ramuli*, emerged on the 24th June; and it continued to do so in abundance till the second week in July. The parasites bred by me were *Olynx gallarum*, L., in great abundance: these all emerged the last week in June. Later came two species of *Pteromalus*, and a few specimens of a small green *Callimome*, with the ovipositor slightly shorter than the body. These may be a variety of *C. auratus*, Fonsc., which is mentioned as a parasite of this species in Dr. Mayr's monograph. I also bred several *Dictyopteryx Læstingiana* from these galls; and Mr. Walker mentions *Anthomyia (Homalomyia) canicularis* as a dweller in them. Mayr remarks on the scarcity of *Synergi*, and says he only bred three specimens of *S. facialis*, H., and nine of *S. radiatus*, Mayr, although he had hundreds of the galls. I can confirm this, as amongst my numerous stores I do not find a single *Ramuli*-bred *Synergus*. He also bred two specimens of *Ceraptres arator*, H., which emerged at the same time, viz., June of the first year.—E. A. FITCH.

COLLECTED OBSERVATIONS ON BRITISH SAWFLIES.

By the late EDWARD NEWMAN.

(Continued from p. 38.)

PROCEED we now again to divide the *Herapods* by metamorphosis and wing-character. Having once fully explained

their true structure, in having shown that they are projected and everted wind-pipes, on which a flying membrane is spread, in the same manner as skin on the projected ribs of a flying dragon (*Draco volans*) or sail-cloth on the ribs of a windmill, it will be useless to attempt the substitution of any other term for that of wing.

The beings then of which this paper treats possess an exo-skeleton, or external skeleton, six legs, and either two, four, or six wings, which are subject to metamorphosis, and which arrive at perfection and maturity by one or other of the following methods:—

1. By passing through an amorphous state,—*Amorpha*,—in which the penultimate state (or pupa, or chrysalis) is provided with neither mouth nor organs of locomotion, consequently it neither eats nor moves, nor does it bear any resemblance to the perfect state. We find that the exo-skeleton, after it has been shed for the last time, exhibits some traces of the liberated imago, and that the various portions, or plaits, or cases, are easily separated, and often spontaneously dehised, the dehiscence taking place at perfectly natural fissures. Although the limbs, notwithstanding their change, and the divisions of the trunk are often thus obviously indicated on the exterior surface of the exo-skeleton, the penultimate cannot be said to bear any resemblance to the ultimate state. This class contains two subordinate classes or sub-classes, or as entomologists, with apparently great impropriety, often call them, “orders,” a term which should be used, as it is in places, for associating those animals that possess similar natural characters, and have propensities in common: thus, the *Feræ* amongst sucklers, the *Accipitres* amongst birds, the *Carnivores* amongst *Coleoptera*, and *Mantides* amongst *Orthoptera*, are really natural orders, and precise equivalents one of the other; and each has an aquatic section, also equivalents of each other. This group, then, is divided into two minor groups by the number and clothing of the wings, thus—(A) *Lepidoptera*, in which the imago has four wings, all of them covered with scales. (B) *Diptera*, in which the imago has two wings only, and these are generally naked, but sometimes sparingly covered with hairs, or more or less seldom with scales: in *Diptera* there are also two poisers, which seem the representative of a second pair of wings, but this is only a matter of opinion; I am unable to prove them to be so; they possess, moreover, a pair of winglets, or lobes, one

at the base of each wing; the precise use of these winglets has occasioned some speculation, but this matter also I must leave in doubt. The penultimate or pupa state of *Diptera* is very different in different families; in some it somewhat resembles that of certain *Lepidoptera*; in others it is an oblong object, quite smooth, and looking as though it had been turned in a lathe.

2. By passing through a necromorphous state,—*Necromorpha*,—in which the penultimate state is provided with mouth and organs of locomotion, detached from the trunk throughout their length, but so swathed and enveloped in separate cases that it can employ neither. The resemblance, therefore, to the perfect insect is considerable, except in the want of locomotive power. This group contains two subordinate groups, principally by the character of the fore wings:—(c) *Hymenoptera*, in which the imago has usually four fully developed wings, which are membranous, naked, and without hairs or scales. (d) *Coleoptera*, in which the imago has two fully developed wings—the hind wings, and two wing-cases which cover the wings, and appear to take the place of fore wings: they are invariably called elytra. These are not needed in flying; they are gently raised, some a very little, others to an angle of 45° , and others even more still; but in all cases, when raised at all, they are sufficiently so to allow full play for the hind and only pair of membranous wings. Besides this power of just lifting the elytra, the insect seems entirely unable to move them, and the wings are never seen vibrating as in other insects; indeed they appear to want the systems of muscles necessary for vibration. This want, which is perhaps a most distinctive character of beetles, seems to have been overlooked by entomologists generally, although noticed by the late Mr. Dale in *Stylops*, which is a manifest *Coleopteron*.

3. By passing through an isomorphous state,—*Isomorpha*,—in which all the states are active and voracious, and of similar form to the imago, except in wing. The imago has four wings, all of them more or less coriaceous or leathery, and all more or less available for flight; the fore wings are not merely raised to allow free action of the hind wings, but even these share in the function of flight: this function is, however, scarcely performed with any energy, but is a sort of half-hearted performance, notwithstanding the wonderful migrations some of these insects perform. There are two subdivisions:—(e) *Orthoptera*, having powerful mandibles,

which in eating move horizontally, and even vertically. (F) *Hemiptera*, or bugs, who live by suction, their organ of manduration being so feeble that they have no power to gnaw or bite hard substances. These insects seem under a general ban; their very name is offensive to ears polite.

4. Besides these there is still a fourth primary class,—*Heteromorpha*,—which, from its earliest situation in the World of Insects, possesses some characters of all the rest, as well as some peculiar to itself. These are the *Neuroptera*, which cannot be differentiated by any character common to them all, yet in distinction of the class. Two very different sub-classes are comprised in this heterogeneous group:—(G) *Stegoptera*, which have a necromorphous pupa. (H) *Neuroptera* proper, or dragonflies, which have an active and voracious pupa, yet totally different from that of all other insects. The dragonflies have four *equally* large wings, and hawk for insects on the wing, which they seize and devour.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DESCRIPTION OF THE LARVA OF *ACIDALIA INTERJECTARIA*.—At the time Mr. Alfred E. Hudd, of Bristol, sent me the eggs of *Acidalia incanaria* (Entom. xi. 18), he also forwarded a few of *A. interjectaria*. They were globular in shape, and of a pale salmon-colour. On the 3rd of August the young larvæ emerged, and were dark purplish brown; the head black. Until autumn they fed on *Polygonum aviculare*, but after hibernation, on withered dandelion leaves, &c. Only one reached maturity, and it I described on April 18th, as follows:—Length nearly half an inch, stout, and rather stumpy in appearance; the head has the face flat, and is distinctly notched on the crown; it is rather narrower than the 2nd segment. The body has a more uniform appearance than many of the species in the genus, but, like its congeners, the segments gradually widen from the 2nd to the 9th; the next three are of nearly uniform width, but narrower than the 9th, and the 13th is still narrower. Like all others of the genus I have seen the segments overlap each other, rendering the divisions distinct, and each segment is also transversely ribbed, and is clothed with very few, scattered, short, bristly hairs. Ground colour a dirty, dull, smoky brown, marbled and variegated with ochreous-yellow, the darker colour

predominating on the front segments, the ochreous on the 9th to 13th segments. The head is also of these two colours, in about equal proportion. Dorsal line ochreous, deeply edged with smoke-colour; there is a distinct white spot on the posterior part of the 6th, 7th, and 8th segments. There are no perceptible subdorsal lines, but a conspicuous ochreous line extends through the region of the spiracles. The ventral surface is of the same dull, dark, smoky brown as the dorsal area, but has a very pretty series of large, ochreous, crescentic marks throughout its entire length, and there is a very faint indication of a pale central line; the hairs are black. This larva spun a slight cocoon of loose threads; and the imago, a fine female specimen, emerged August 4th.—G. T. PORRITT; Highbroyd House, Huddersfield; February 6, 1878.

LEUCOPHASIA SINAPIS AT REST.—Had my dear friend, the late Edward Newman, ever mentioned to me that *Leucophasia sinapis* had never been observed at rest, as stated by Mr. Whittle in the 'Entomologist' for March (Entom. xi. 69), I should have given him the result of my experience of this species. When Pembury, near Tunbridge Wells, was visited by me every year for the purpose of collecting *Lepidoptera*, I have often seen the insect at rest, and many of the specimens in my cabinet were so captured. It was my practice to resort to the woods frequently at night, and by the artificial light of my lantern I found that *L. sinapis* was more easily seen at rest at that time than during the day. Its appearance was then conspicuous by the sides of the drives; and it invariably carried its wings closed over the back, as is the case with all the *Pieridæ* with which I am acquainted. I am inclined to think that the specimen seen by Mr. Whittle had but recently emerged from the chrysalis, and that its wings were limp.—J. JENNER WEIR; 6, Haddo Villas, Blackheath, March 3, 1878.

SPRING CAPTURES, 1878.—While staying in Norfolk, at Lord Walsingham's, during the last week in February, I took a male specimen of *Nyssia hispidaria*; and also saw flying round the hall-lights *Hybernia leucophearia* and *H. progemmaria*. In Epping Forest *N. hispidaria*, *Phigalia pilosaria*, *Amphydasis prodromaria*, and *H. leucophearia*. In thistle-stems, in same locality, larvæ and pupæ of *Ephippiphora scutulana*, commonly. This is, I believe, the first time *N. hispidaria* has been recorded from Norfolk.—THOS. EARLE; 40, Goldsmith Row, Hackney Road, E., March, 1878.

EARLY APPEARANCE OF INSECTS.—The effects of the mild winter we have just passed are now to be noticed in the unusually early appearance of some of our spring species of insects; and, should we not experience any very sharp frosts or a long continuance of east winds, entomologists may look forward to a season that promises to be a much more successful one than we have enjoyed of late years. On the 3rd of March I saw a very lively specimen of *Gonepteryx rhamni* in a garden at Wandsworth; and a single specimen of *Biston hirtaria* and *Hemerophila abruptaria* in a London Square this morning. These are the earliest dates at which I have ever observed these species. Last week a specimen of *Mamestra brassicæ* was brought to me, which had flown in through an open window: it was in fine order, and had evidently only recently emerged from the pupa.—WALTER P. WESTON; 1, Duncan Terrace, N., March 20, 1878.

SELENIA ILLUSTRARIA.—I have already at this early period of the season bred six specimens of *Selenia illustraria*, one of which is a small female exceedingly rich in colour. This is unusually early, and possibly forebodes an exceptional season.—J. R. WELLMAN; 14, Portland Place North, Clapham Road, March 16, 1878.

SERICORIS DOUBLEDAYANA.—While collecting during the last week in July, 1877, on the banks of the River Bure, Norfolk, I found *Sericoris Doubledayana* not infrequently. This species may easily be overlooked, as it flies gently amongst marsh-fern (*Lastrea thelypteris*), bog-myrtle (*Myrica gale*), and reeds, in the late afternoon sunshine. It is necessary to separate the stems and actually look for the moths, so little do they rise above the under-growth. They were in beautiful condition at this date.—E. G. MEEK; 56, Brompton Road, London, S.W.

HEUSIMENE FIMBRIANA.—A fine female of this species appeared in one of my cages on the 20th of February last, being the earliest date of appearance that has come under my notice.—W. MACHIN; 22, Argyle Road, Carlton Square, E., February 23, 1878.

ÆCHMIA DENTELLA AND EPHIPPIPHORA NIGRICOSTANA.—At the end of May, 1866, I beat from the flowers of the common elder four fine specimens of *Æchmia dentella*; and from the same hedge, at Plumstead, six specimens of *Ephippiphora nigricostana*, which had evidently but recently emerged from pupæ. I have since reared the latter species from the roots of *Stachys sylvatica*.—LD.

COLEOPHORA PALLIATELLA.—When beating for larvæ generally, in June last, at Bishop's Wood, near Selby, I found seven cases of *Coleophora palliatella*, from which I reared five beautiful specimens. This is, I believe, the first record from Yorkshire of this species.—W. PREST; 13, Holgate Road, York, March, 1878.

ADDITIONS TO DR. POWER'S LIST OF IRISH COLEOPTERA.—I should say that anyone wishing to investigate the *Coleoptera* of Ireland should give the northern counties a fair trial. As regards my experience I can only speak of the district surrounding Glenarm, say within a radius of five miles. I have not zealously investigated this locality, the *Coleoptera* only being a secondary consideration with me. When in search of *Lepidoptera* I have taken at different times over two hundred species, some local and not uncommon, and I have no doubt the list could be considerably extended. Glenarm lays within easy distance of Larne and Belfast; is situated in a vale opening on the bay; a river runs through the valley, which is well wooded on each side, and covered with a carpet of the brightest verdure. The following are a few additions to Dr. Power's list:—*Elaphrus cupreus*, wet places, common. *E. riparius*, wet places, common. *Loricera pilicornis*, common. *Cychrus rostratus*, not very common. *Carabus nitens*, common under moss. *C. clathratus*, common under moss. *C. granulatus*, common under moss. *Leistus spinibarbis*, abundant. *L. fulvibarbis*, abundant. *L. rufescens*, abundant. *Clirina fossor*, common in gardens. *Dromius 4-maculatus*, common in gardens. *Calathus cisteloides*, common. *C. mollis*, common. *Anchomenus junceus*, locally abundant. *A. livens*, locally abundant. *A. dorsalis*, locally abundant. *A. lævis*, locally abundant. *A. viduus*, locally abundant. *Bradycellus rufulus*, uncommon. *Pterostichus niger*, common. *P. melanarius*, common. *P. nigrita*, common. *P. erythropus*, common. *Amara obsoleta*, sandy places. *A. communis*, sandy places. *Harpalus æneus*, under stones. *Trechus micros*, local. *Bembidium guttula*, sweeping. *B. nitidulum*, common. *B. velox*, common. *Agabus bipustulatus*, in peat holes. *Gyrinus natator*, in peat holes. *Homalota gregaria*, rotten wood. *Tachinus proximus*, common. *Quedius impressus*, common. *Creophilus maxillosus*, common. *Gastrophysa raphani*, abundant on dock. *Ocypus cupreus*, abundant. *O. mario*, abundant. *Philonthus æneus*, abundant. *Othius fulvipennis*, abundant. *Necrophorus mortuorum*, abundant.

Silpha opaca, under carrion, abundant. *S. nigrita*, under carrion, abundant. *S. atrata*, under carrion, abundant. *Hister neglectus*, sweeping, abundant. *H. cadaverinus*, sweeping, abundant. *Aphodius fossor*, common, river bank. *Apion assimile*, common. *Chrysomela didymata*, common. *Telephorus discoidens*, foliage, common. *T. flavilabris*, foliage, common. *T. testaceus*, foliage, common. *T. bicolor*, foliage, common. *T. nigricans*, foliage, common. *Elater cinnabarinus*, under stone, scarce. *Phyllobius oblongus*, common. *P. uniformis*, common. *Necrobia rufipes*, common. *Catops tristis*, common.—THOMAS BRUNTON; Glenarm Castle, Larne, North of Ireland, January, 18, 1878.

AROMIA MOSCHATA.—I have just noticed the capture of *Aromia moschata*, in Dumfriesshire, mentioned in the December 'Entomologist' (Entom. x. 304). Although this is the first instance I have heard of the perfect insect in Scotland, I may mention that, in the July number of the 'Scottish Naturalist' for 1875, I notified the capture, in Haddingtonshire, of the larvæ of the above-mentioned insect.—A. BUCHAN-HEPBURN; Junior Carlton Club, February 1, 1878.

RANATRA LINEARIS ATTACKING CARP EGGS.—In the last session of the Naturforschende Gesellschaft of Görlitz, the President, Dr. Peck, made an interesting communication on a newly-discovered enemy of the carp. It appears that large numbers of the spawn of this fish are attacked by the water-bug (*Ranatra linearis*), which fastens itself firmly on the back of its prey with its fore feet, and by means of its sharply-pointed trunk sucks out the small amount of blood in the young organism. A series of experiments, conducted in some large establishments for fish culture, show that the only method of fighting this new foe is to drain the ponds dry and re-stock them with fish.—'NATURE.'

FAILURE OF TRIFOLIUM INCARNATUM.—It is well known that *Trifolium incarnatum* soon after its appearance above ground suddenly disappears. In common with many others I have been at a loss to account for this. It was explained by a friend of mine drawing my attention to a small brown insect, something like a beetle, about a quarter of an inch long, which found a refuge in the top joint of the stubble, on which the seed is usually drilled without being moved by the plough. I sent some specimens to Mr. Murray, who for some years has devoted his attention to destructive insects, and whose death I was sorry to see recorded. Mr. Murray pronounced the insect to be of a destructive

nature to pea and other crops. This season we slightly skimmed the stubble, and got rid of the wheat-stalks as well as we could. The plant on land so treated has not failed, though near at hand that drilled on the unmoved stubble has failed, in which cases I found the insect in its place of refuge, the first joint of the straw left as stubble. This may be known to others, though new to me.—J. C. CLUTTERBUCK.

[This little insect depredator was probably *Sitones*, which is so fond of hiding in the stubble. The whole proceedings are altogether confirmatory of my remarks (Entom. x. 213). E. A. F.]

NATIONAL ENTOMOLOGICAL EXHIBITION.—This Exhibition was held at the Royal Aquarium, Westminster, March 9th to 23rd, and was highly successful. It has been found impossible to furnish an adequate report this month, but an interesting paper will appear in the May number.—ED.

REVIEW.

Illustrations of Varieties of British Lepidoptera. By S. L. MOSLEY. Part I. Huddersfield, 1878.

Mr. Mosley deserves every credit for the manner in which he has brought out the first part of this curious series. It requires much confidence on the part of an author now-a-days to issue a book consisting principally of plates, all coloured by his own hand. In this first number are six plates, representing the genera *Colias*, *Smerinthus*, *Callimorpha*, *Chelonia*, *Liparis*, and *Abraxas*. The best figures are those of *Colias Eduxa* and *Abraxas grossulariata*. In colouring his plates Mr. Mosley has been generally successful; but we would suggest that the letterpress descriptions might with advantage be extended, especially with regard to localities of capture, and any circumstances likely to lead to our ascertaining the causes of these sports of Nature. We suppose there is some difficulty in obtaining subjects for this work, for several have already been recently figured, and others are not so exceptional as we might expect; but this improvement in choice will increase as the work becomes better known. Altogether the author may be congratulated on his effort in the cause of Science. He sets a good example to the many who will look over his book with more than passing interest.

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VARIETY OF *CIDARIA SUFFUMATA*.

By JOHN T. CARRINGTON.



CIDARIA SUFFUMATA (VARIETY).

THE very beautiful example, an extraordinary variety, of *Cidaria suffumata*, from which the accompanying figure is drawn, is kindly lent by Mr. Geo. T. Porritt, of Huddersfield. It was captured at Almondbury, near Huddersfield, where it was disturbed from amongst underwood, in May, 1871. The carefully-drawn figure, given above, renders unnecessary any description of the very marked variation from the type of *C. suffumata* in this specimen. It may be well to remind our readers that, excepting in the well-known unicolorous form (*Piceata*), this species is not usually prone to variation.

FIRST NATIONAL ENTOMOLOGICAL EXHIBITION.

THIS Exhibition was held at the Royal Aquarium, Westminster, from the 9th to the 23rd of March, and attracted the attention of numerous entomologists, besides being of considerable interest to the general public.

The following gentlemen accepted the invitation of the Royal Aquarium Society to act on the Committee:—Sir Sidney Smith Saunders, C.M.G. (chairman); J. Jenner Weir, F.L.S. (vice-chairman); Sir Thomas Moncreiffe, Bart.; G. W. Bird; Edwin Birchall, F.L.S.; Fredk. Bond, F.L.S.;

J. B. Bridgman; S. J. Capper; John T. Carrington; Rev. H. Harpur Crewe, M.A.; Rev. T. W. Daltry, M.A.; Thomas Fiedle; G. Elisha; E. A. Fitch; Battershell Gill, M.D., F.R.C.S.; H. Goss, F.L.S.; Rev. Joseph Greene, M.A.; Noah Greening; C. S. Gregson; W. L. Horley; W. F. Kirby; W. H. Lowe, M.D., F.R.C.P.; Rev. O. P. Cambridge, M.A.; G. T. Porritt, F.L.S.; J. A. Power, M.A., M.D.; W. Prest; J. G. Ross; Frederick Smith; Samuel Stevens, F.L.S.; Howard Vaughan; J. R. Wellman; W. P. Weston; and F. Buchanan White, M.D., F.L.S. Most of the London Entomological and Microscopical Societies sent delegates to discuss the necessary preliminaries. Mr. A. B. Farn gave his services as Secretary; and a sub-Committee was afterwards elected by the general Committee, consisting of Messrs. Carrington, Farn, Meek, Vaughan, Jenner Weir, Wellman, and Weston, upon whom fell the task of compiling the Catalogue, the assortment of the cases exhibited, and the whole of the general arrangements. The management of the Exhibition, after the opening, was carried out by Mr. Carrington.

All orders of insects were well represented; and the invitation to exhibit was most cordially responded to by numerous entomologists from all parts of the country, many of whom sent the whole of, and others very extensive selections from, their cabinets.

In the *Coleoptera* were the complete collections of Dr. Power, and of the late T. Wilkinson, of Scarborough, exhibited by Mr. E. G. Meek; and the *Curculionide* of Mr. S. Stevens. Mr. G. C. Champion also sent the greater part of his collection, which certainly bears away the palm for its beauty of arrangement. Amongst his numerous rarities were especially noticeable two out of the four known specimens of *Amara alpina*; a series of *Harpalus 4-punctatus*; single specimens (unique as British) of *Leptasa testacea*, *Aleochara hybernica*, *Cardiophorus rufipes*, *Homalota egregia*, and *H. rufotestacea*; three examples of the rare *Emus hirtus*; two *Compsochilus palpalis*, and specimens of the two rarest species of *Aphodius*—*A. scrofa* and *A. consputus*. There were also examples of *Phosphaneus hemipterus*, *Anthicus bimaculatus*, a series of *Lymnæxylum navale*, and an almost perfect collection of *Anisotomida*, including two out of the three known specimens of *Anisotoma pallens*, and fine series of *Agaricophagus* and *Coleuris*.

Dr. Power's collection has comparatively few gaps of insects known to be British, besides a large number of series of very rare insects, including *Lebia Crux-minor* and *Quedius dilatatus*, in all stages of development. Of unique species there are *Borboropora Kraatzii*, *Stenus oscillator*, *Ceuthorynchus suturalis* and *C. pulvinatus*, *Apion sipeticum*, *Orchesles sparsus*, *Thyamis fuscula*, and *Agriotes pilosus*. Amongst the species, of which only one or two examples exist in other collections, were *Lebia hæmorrhoidalis*, *Carabus auratus*, *Agabus tarsatus*, *Tachyusa coarctata*, *Amara infima*, *Anchomenus gracilipes*, *Hydroporus unistriatus*, *Stenus glacialis*, *Anisotoma curta* and *A. lunicollis*, *Plomaphagus varicornis*, *Oxylæus variolosus*, *Telephorus ater*, *Scraptia nigricans*, and many others. The collection of *Geodephaga*, *Hydrophilidæ*, *Hydradephaga*, *Curculionidæ*, and *Halticidæ*, was almost complete.

Mr. Stevens's *Curculionidæ* were very rich in species, comprising *Rhynchites Bacchus* and *R. auratus*, *Tropideres sepicola*, a series of *Bagous binodulus*, *Procas picipes*, and both sexes of *Apion lævigatum*.

Mr. West exhibited a very fine *Calosoma sycophanta*, taken a few years ago in the Isle of Wight.

The only exotic *Coleoptera* were a selection from West Africa and Ashantee, sent by Mr. Swanzy, consisting chiefly of *Lamellicornes* and *Longicornes*, including some very fine examples of the "Goliath" beetles (*Golithus Drurii*).

The *Hemiptera* were represented by the very fine collection of Dr. Power, which is one of the most complete in Britain, and contains large series of some very rare species. Perhaps the most notable are a specimen of *Lygæus equestris*, of which there is but one other; *Sehirus costatus*, a series; *Eremocoris plebeius*, which is unique; *Notochilus limbatus*, believed to be unique; fine series of *Chilacis typhæ* and *Dictyonota Fieberi*; a series of the very rare *Mesovelvia furcata*; *Capsus scutellaris*; all four species of *Acanthia*; *Salda Flori*, a series; *Metastemma girpula*, it is said there is only one other; *Hydrometra aspera*, a new British species, only taken by Dr. Power; large series of very rare *Aphelochira æstivalis*; a mass of *Corixas*; series of *Sigara Scholtzii*, only taken by Dr. Power; and *S. Poweri*, unique.

The collection of British aculeate *Hymenoptera*, exhibited by Mr. Frederick Smith, is the most complete ever formed, containing not only fine series of almost every known species, but also examples of others not in any other cabinet. Among

the rarer species may be named *Prosopis cornuta* and *P. variegata*; *Andrena Haltorfiana*, *A. ferox*, *A. mouffetella*, and *A. polita*; *Halictus sexcinctus*, *Macropis labiata*; the unique specimen of *Rophites quinquespinosus*, captured last year at Guestling, near Hastings; *Nomada Bridgmaniana*, *N. armata*, *N. baccata*, and *N. Roberjeotiana*; *Osmia parietina*, *Heriades truncorum*, and *Megachile pyrina*. There was also a remarkable hermaphrodite of *Anthophora acervorum*, having the left side male, with the intermediate leg elongated and fringed, whilst the opposite leg was of the ordinary female type; as well as hermaphrodite examples of *Andrena nitida*, *Nomada baccata*, and *Apis mellifica*. The humble-bees contained a splendid series of *Bombus Smithianus*, and four examples of *B. pomorum*, not in other British collections. The *Formicidæ* contained every known species found in this country. The drawers of fossorial *Hymenoptera* were full of rare species, especially *Methoca ichneumonoides*, *Pompilus sericatus* and *P. notatus*, *Ceropiles variegata*, *Aporus unicolor* and *A. femorata*, *Miscophus bicolor* and *M. maritimus*; also *Artata stigma*. Among the *Vespidæ* were a fine series of the very local *Eumenes coarctata*; and of *Odynerus lævipes* and *Vespa arborea*, both being first discovered by Mr. Smith. The tongues of the genera of bees accompanied the insects; exhibiting in a very instructive manner the gradual development of that organ, from the short, blunt, wasp-like tongue of the genus *Colletes*, to the elongate form found in the groups *Anthophora* and *Bombus*.

Sir Sidney S. Saunders lent a collection of Grecian *Hymenoptera*, with their galleries and cells formed in the stems of various briars, as well as their parasites and larvæ. Amongst them were specimens of *Osmia tridentata*, *Megachile centiuncularis*, and the beautiful blue-black *Xylocopa cyaneus*; a fine series of the narrow-bodied *Raphioglossa eumenoides*; and *Psiluglossa odyneroides*, in which the sexes are remarkably distinct.

Amongst the remaining insects in this group were two drawers of aculeate *Hymenoptera*, sent by Mr. Goodman; and some British *Hymenoptera*, by Mr. Mapleston.

As might be expected, from the large number of entomologists who devote their attention to the British *Lepidoptera*, the cases containing insects of this group were very numerous, and included selections from nearly every large collection.

The *Diurni* of Mr. S. Stevens were very fine, and exceed-

ingly rich in varieties, containing, amongst many others, a very fine hermaphrodite *Colias Edusa*; two varieties of *Vanessa Cardui*, similar to the figure in Newman's 'British Butterflies,' one of them being very large and brightly coloured. There were also black varieties of *Limenitis Sibylla*; some extraordinary *Satyrus Janira*, in which the ground colour is entirely blanced, and others with a large colourless patch in each wing; a white variety of *S. Tithonus*; a magnificent row of fourteen *Polyommatus dispar*; some dusky and white examples of *P. Phlæas*;* an hermaphrodite *Lycæna Alexis*, having the wings on the left side female, and on the right side male; other varieties of *L. Alexis*, *L. Adonis*, *Syrichthus alveolus* var. *Lavateræ*, and some bone-coloured *Hesperia linea*.

Mr. P. H. Harper, F.R.C.S., exhibited a case showing the remarkable extent to which *Colias Edusa* is prone to vary, including every gradation from the typical *Edusa* to the whitest-coloured examples of the variety *Helice*, and most of them captured during the past year.

In the drawers shown by Mr. G. W. Bird were a fine series of *Apatura Iris* and its larvæ, from Kent; and a splendid row of *Vanessa Antiopa*, five of which were captured in Norfolk, three in Yorkshire, and one each in Leicestershire and Essex.

Mr. C. A. Briggs showed a remarkable collection of varieties of the genus *Lycæna*, including one hermaphrodite *L. Ægon*, having the wings on the right side male, and on the left female; also numerous varieties of *L. alexis*, and two hermaphrodites, both having the wings on the left side male, and on the right female; a remarkable series of varieties of both upper and under sides of *L. adonis*, including two females, having streaks of the male colouring; and *L. corydon*, with the distinct blue and brown forms of the female.

Among the other specialities were an entirely black variety of *Arge galathea*, belonging to Mr. Farn; and two varieties of *Colias Edusa*, from the collection of Mr. W. P. Weston, the one having the wings on the right side the variety *Helice*, and on the left the typical *Edusa*; and the other with the anterior wings *Helice*, and the posterior wings *Edusa*.

The Rev. Windsor Hambrough exhibited a drawer of rarities, including hermaphrodite *Colias Edusa*; a remarkable variety of *Vanessa urticæ*, in which the usual black markings were concentrated into four confluent blotches; varieties of *Lycæna Corydon* and *L. agestis*; and the specimen of

Argynnis, captured in the New Forest, and named *Niobe* by the late Mr. Doubleday, but upon its correctness there seems to be some doubt. There was also a specimen of *Callimorpha Hera*, taken on a lady's dress, at Brighton; two *Deilephila lineata* and one *Charocampa celerio* from the same locality; *Acronycta alni* from Warwickshire; *Sterrhia sacraria* from Hampshire; and many others of equal interest.

Mr. G. Elisha kindly sent the whole of his fine collection; and his example was followed by Mr. Wellman, whose collection is a thoroughly typical one, well worked up, and the insects in splendid order, the greater portion of them having been reared by himself. Amongst them we noticed a bred series of *Melitæa Artemis*, chiefly from Ireland; some yellow forms of *Zygæna trifolii*, reared from larvæ; fine varieties of *Bombyx callunæ* and *Angerona prunaria*; dark varieties of *Tephrosia crepuscularia* and *T. biundularia*; a specimen of the male *Biston hirtaria*, assuming the colouring of the female; a fine *Platypteryx sicula*; and the remains of a specimen of *Boletobia fuliginaria*, rescued from a spider's web at Wandsworth.

In the *Nocturni* were two drawers containing the genera *Smerinthus*, *Acherontia*, *Callimorpha*, and *Chelonia*, exhibited by Mr. A. H. Jones; and a fine collection of *Sesiidæ*, containing examples of *S. culiciformis*, having the band yellow; and some *S. sphecoformis*, from Tilgate Forest, shown by Mr. Bird; who also sent a drawer of *Notodontidæ*, including some dark varieties of *Clostera curtula*.

Dr. Gill exhibited his *Eupitheciæ*, a group in which he is particularly interested, containing fine series of nearly every species, including *E. pusillata*, *E. irriguata*, *E. knautiata*, and *E. subciliata*; and single specimens of *E. arceuthata* and *E. egenaria*.

Mr. Howard Vaughan exhibited a drawer of varieties of British *Noctuæ*, including *Cymatophora duplicaris*, *Mamestra abjecta*, *Agrotis cursoria* and *A. lucerneæ*, *Triphæna orbona*, *Cerastis erythrocephala*, *Dianthæcia conspersa*, and *Hadena protea*, besides many others; also his *Cudariæ*, including many extraordinary varieties of *C. russata*, *C. immanata*, *C. suffumata*, *C. silaceata*, and a specimen of *C. reticulata*. The especial object in exhibiting these insects was to show the marked difference between examples of the same species taken in widely-distant localities.

The fauna of the fen district of Norfolk and Cambridge-

shire was well represented by Mr. A. B. Farn, who has worked these localities indefatigably, and succeeded in taking a magnificent series of the rare *Meliana flammea*, *Senta ulvæ*, *Nonagria brevilinea* (with its variety *sinelinea*, being the form in which the line at the base of the wing disappears), *N. neurica*, a melanic (female) variety of *N. typhæ*, *Hydrilla palustris*, a series of the rare *Nascia cibialis*, and *Bankia argentula* (from Cambridgeshire), besides many others. Mr. Farn also exhibited some remarkable forms of *Triphæna orbona* var. *Curtisii*, and other curious forms from the Scilly Isles; a series of *T. subsequa*; and an extraordinary hermaprodite of *Clostera curtula*.

Amongst a drawer of varieties of *Noctuæ* and *Geometræ*, sent by Mr. J. A. Clark, was a remarkable variety of *Venilia maculata*, having the fore wings traversed near the base by a broad band of olive-green, while the only other markings consisted of four large blotches of the same colour near the outer margin.

Some cases of Scotch *Lepidoptera*, exhibited by Sir Thos. Moncreiffe and Mr. Herd, illustrative of the fauna of Perthshire, were very interesting, and included a lovely variety of *Chærocampa porcellus*, in which the ordinary colour was replaced by gray with lemon markings; and two very dark *Hepialus velleda*. Dr. Buchanan White sent with these a variety of *Odontopera bidentata*, one *Peronea grevillana*, and a series of *Ablabia argentana*; likewise a series of species in the genus *Oporabia*, with sketches, showing the points of difference.

Messrs. Porritt and Varley showed the specimen of *Chærocampa nerii* that was taken in Hemel Hempsted, October, 1876; an olive-banded variety of *Lasiocampa quercus*, from Huddersfield; a white variety of *Polyommatus Phleas*; a very fine *Cidaria suffumata*, with the broad central fascia and shoulder-patch black, remainder of wings white (figured in this number); and four varieties of *Chelonia caja*,—one the unicolorous dusky form, the second having the usual white markings in the apical portions of the front wings a bright rosy hue, the third with the hind wings bright orange, and the fourth with a broad band of white across the fore wings (the darker markings appearing in six unconnected irregular spots or streaks), and on the hind wings the spots were confluent, forming a broad band, which occupied nearly one-third of the whole surface. Mr. W. H. Gaze exhibited selections from the old collection formed by the late Mr. Ingall, and

now in the possession of St. Bartholomew's Hospital. Mr. W. H. Thornthwaite exhibited specimens of *Heliothis scutosa* and *Noctua flammatrix*: *Luperina Dumerili* and *Margarodes unionalis* from Devonshire, in 1877. All the above, except *L. Dumerili*, were, it is stated, taken at light.

Mr. Prest, on behalf of the Yorkshire Naturalists' Society, brought up a very complete collection, including one *Pieris Daphidice*; four *Vanessa Antiopa*, from Yorkshire; six *Lycana Acis*, taken at Cardiff in 1877; two *Deilephila Euphorbiæ*; one *D. lineata*; a series of *D. Galii*; three *Charocampa celerio*, two of which were taken in Yorkshire, and the other in Berwickshire; a *Lasiocampa ilicifolia*, from near Ripon; local forms of *Hepialus velleda*; some streaky varieties of *Arctia lubricipeda*; an hermaphrodite *Epione tespertaria*; single specimens of *Eupithecia extensaria* (Yorkshire, 1873) and *Eubolia maniata* (Yorkshire, 1872); some remarkable melanic varieties of *Eupithecia albipunctata*; specimens of *Platypteryx sicula*, *Dicranura bicuspis*, *Acronycta alni*, *Xylina conformis*, and many other rarities. Also a web, spun by the larvæ of *Ephestia elutella*, nearly eight feet long and four feet wide, found on the walls of a chicory warehouse in York, and described in a former number of the 'Entomologist.' It may be added that when twisted into a rope-like form this web had supported a weight of fifty-six pounds.

Mr. E. G. Meek exhibited two drawers of insects from the south-west coast of Ireland, containing amongst others a series of *Procris statice*, of which it was remarkable that both sexes were the same size; also a selection of *Lepidoptera* from Scotland, including a long series of *Noctua sobrina*, *N. neglecta*, *Pachnobia hyperborea*, *Hadena glauca*, *Taniocampa gothicina*, and *Anarta melanopa*; and a drawer containing *Crambus uliginosellus* and *Schœnobiaus gigantellus*, and other insects from the Norfolk fens.

Amongst the other numerous *Macro-Lepidoptera* were the exhibits of Mr. J. Bryant, containing a remarkable variety of *Lasiocampa quercifolia*: of Mr. W. Harper, containing *Argynnis Lathonia*, taken at Darent Wood in 1868, and specimens of *Deilephila Galii*, *Cymatophora ocularis*, *Agrotis Athecorthii*, and *Plasia orichalcea*; and of Mr. F. Bartlett, with a pale variety of *Liparis dispar*, *Cymatophora diluta* and variety, *Leucania albipuncta*, *Triphæna subsequa*; and the specimen of *Euparia fulvago* taken in Highgate Wood in 1870.

The *Micro-Lepidoptera* were represented by the entire collections of Mr. P. H. Harper and Mr. Machin. In the former were examples of *Coccyx cosmophorana* and *C. pygmæana*, *Ephippiphora ravulana*, *Penthina Grevillana*, *Mixodia Bouchardana*, and several *Peronea umbrana* and *Spilonota pauperana*. Mr. Harper is also particularly rich in the genera *Coleophora* and *Nepticula*. Amongst Mr. Machin's insects were specially noticeable *Madopa salicalis*, *Sophronia emortualis*, a series of *Cryptoblabes bistrigella*; and a magnificent collection of the *Peroneas*, especially the varieties of *P. cristana*.

Mr. Machin also sent the whole of his *Tineinæ* and *Pterophori*,—for beauty of preservation and correctness of nomenclature his nineteen drawers of *Micro-Lepidoptera* excelled all others; Mr. W. P. Weston, the two first boxes of his *Tortrices*; and Mr. West, the specimens of *Leptogramma scabrana* bred from the eggs of the so-called species *Boscana*.

Mr. Weir exhibited his *Tineinæ*, in which each species was mounted on a separate cork tablet, so as to facilitate re-arrangement without injuring the specimens. This system was both interesting and unique.

The most interesting and instructive exhibit was undoubtedly the magnificent collection of preserved larvæ, sent by Lord Walsingham, containing nearly four hundred species, showing the larvæ in different stages of development, and arranged in the most natural manner on dried, or imitation pieces of their respective food-plants; and above each species was a single imago, representing the species to which the larvæ belonged.

Several cases illustrated the ravages of the larvæ of *Cossus ligniperda*; and the five large drawers sent by Mr. J. S. Capper, of Liverpool, contained a typical and educational collection of all orders of British insects.

The exhibits of Messrs. Barker, Davis, Eedle, and others, also illustrated the life-history of several species of British *Lepidoptera*, and other orders of insects.

Amongst the exotic *Lepidoptera* were specially noticeable the fine collection of *Ornithopteras* and *Papilios* of the world, sent by the Rev. F. A. Walker. Amongst the former were *Ornithoptera Cræsus*, so named from the black and gold colouring of the male; and some perfect males of the rare *O. Brookeana*, from Sarawak. The *Papilios* comprised examples of the rare *Papilio Semperi*, from Mindanao;

P. Gundlachianus, from Cuba; *P. Zalmoxis*, from West Africa; and two singular butterflies, from the Himalayas, *P. Pagani*, in colour closely resembling a withered leaf. There were also a fine series of *P. Parsodes* and *P. Sesostris*, and other South American species, in which the green markings of the male are replaced by white in the female; *P. Brutus* and *P. Merope*, which possess the peculiarity of having the female sometimes cream-coloured and tailed like the male, and in other instances black and white, or black and tawny and tailless; and some curious varieties of *P. Memnon*. In one drawer were examples of the closely-allied *P. Demoleus* and *P. Erithonius*, the former of which occurs in Africa and Madagascar, while the latter is confined to Asia and Australia.

Mr. Swanzy exhibited some drawers containing illustrations of protection afforded to some species of butterflies which are eagerly devoured by birds and other insectivorous creatures, by resembling other species, which from their power of emitting an extremely unpleasant odour are never, or very rarely, attacked by them. Amongst them were examples of *Diadema Bolina*, which mimics *Danaïs Archippus*; *Acræa Gea*, mimicked by *Panopea Hirce*; and *Danaïs Damocles*, by *Diadema Damoclina*. The female of *Papilio Merope* seems to be protected by two species: on the Gold Coast by *Danaïs Niavus*, which closely resembles the variety of the female that is found there; and by *Danaïs Echeria*, which is rare in that locality, but abundant in Natal, where the female *P. Merope* closely resembles it.

Some drawers, lent by Mr. Jenner Weir, also contained instances of the imitative resemblance existing between the *Danaïnae* and *Heliconiæ*.

Mrs. Skeen exhibited a collection of insects from Ceylon; but as none of them were named they lacked some of the interest they would otherwise have attracted.

Examples of South American butterflies, including the splendid *Morpho Cypris*, were shown by Mr. Meek; some Mexican *Lepidoptera*, by Mr. J. A. Clark; some cases of Himalayan butterflies, collected by himself in Nepaul, by General Ramsay (these were remarkable for beauty of condition and preservation, besides containing at least one new species). Some Brazilian *Lepidoptera* were shown by Mr. Oldham; a selection of the insects of Jamaica, by Mr. Bowrey; and several cases of miscellaneous foreign species, by other gentlemen.

Mons. Wailly exhibited some interesting cases of silk-producing *Bombyces*, as well as some living cocoons; and Mr. Ashmead, a case with specimens of the gorgeous *Urania Madagascariensis*, from Madagascar.

The *Arachnidæ* were represented by one drawer, sent by Mr. Hillman; who also sent two drawers containing galls and other excrescences caused by insects on plants. The only other galls were sent by Mr. Billups. Mr. Wakefield contributed some *Neuroptera* from New Zealand.

There were also some hybernating larvæ of *Chelonia villica* sent by Mr. Reed; and *Acidalia scutulata*, *A. rusticata*, and *A. immutata*, showing his very successful method of breeding, by Mr. H. Bartlett; while Mr. C. Wallmot showed some living specimens of water insects.

Some combs, surrounded by the paper-like envelope of *Vespa vulgaris*, with hybernating females, were shown by Mr. Trew; and a case of living Italian bees, with a large selection of bee-hives, specimens of produce, and apparatus for bee keeping, by Messrs. Neighbour and Sons.

A separate department was set apart for microscopes, of which there were over forty exhibited; and which, from the amount of attention they received, appeared to be especial objects of interest to the public.

The method of mounting insects for microscopic examination without pressure, introduced by Mr. Enoch, must, we think, revolutionise the present system of mounting entomological subjects. A knowledge of the muscular structure can by this process be obtained, which it is impossible to be gained by a study of the specimens when squeezed out of all shape by the old system of mounting.

The walls of the galleries in which the Exhibition was held were hung with diagrams and water-colour drawings. Amongst the latter were a series illustrating the larvæ of thirty-eight species of the genus *Eupithecia*: these were executed in admirable style by Mr. W. Buckler, and lent by the Rev. H. H. Crewe. Fifty coloured drawings of exotic butterflies, by Mr. S. L. Mosley, commanded universal admiration. Mr. C. S. Gregson sent a number of photographs of his very fine varieties of *Abraxas grossulariata*; and some exceedingly interesting sketches, from nature, of the life-histories of several of the *Pterophori*, &c.

The only example of fossil Entomology was contributed by Mr. E. Charlesworth, who sent his celebrated Stonefield fossil butterfly.

It is our pleasing duty to add that we believe in every instance, with one exception, the exhibits were received and returned without damage or depreciation. This is a source of some congratulation, when we consider how fragile were the subjects.

From a popular point of view the Exhibition was a complete success. During the fortnight it was open it was visited by upwards of 70,000 people; and the manner in which large numbers of persons went carefully through, with catalogue in hand, showed more than passing interest. It was favourably noticed by about forty scientific and other papers, one contemporary only adversely criticising; but as that communication is anonymous it is unnecessary to further notice it. Taken as a whole the Exhibition was interesting enough to be popular, and scientific enough to be instructive.

The Exhibition, further, quite fulfilled the intention of its promoters; for, besides their endeavour to make Entomology a popular study, it was the means of bringing together a large number of entomologists from all parts of the country, many of whom, though known to one another by correspondence, had never met before; and by an exchange of experience they were enabled materially to add to each other's store of knowledge. So that, besides the opportunity of examining the finest collection of insects ever brought together, many entomologists will have most pleasant and profitable recollections of the time they spent at the First National Entomological Exhibition.

A. B. FARN,

The Dartons, Dartford, Kent.

W. P. WESTON,

1, Duncan Terrace, N.

NOTES ON VARIATION IN COLOUR IN CERTAIN LARVÆ.

By H. M. GOLDING-BIRD.

SOME interesting correspondence was published a few months ago on the subject of "Melanism in certain Moths;" and though the subject is hardly akin to mine, yet it was this that first led me to mark particularly the modification of colour to which certain larvæ are subject when removed from

their natural surroundings. I noticed this disposition especially in *Catocala nupta* and *Biston hirtaria*, two larvæ which, in the newer squares of western London, occur together, and are occasionally found side by side on the trunks of various species of poplar, willow, &c. On the 14th of June I found six larvæ of *C. nupta* on a small bough of willow: they were a little over a quarter of an inch in length, of a pale brown colour, with no perceptible markings. These I put into a glass pan with their food and some old flannel, as I had before noticed their fancy for resting on damp pieces, which at one time I had wound round the stalks of their food to keep it fresh: they are fond of lying close against it, clasping it with all their legs, of which the first two pairs are conspicuous from their length, whilst the rest are partly hidden by the curious fringe above them; they hide themselves in a fold of the flannel when about to moult. These six larvæ never gained in colour; their markings were scarcely to be traced; they remained very little darker than the flannel during the whole of this stage of their existence.

After I had had these larvæ a short time I found another on the same bough, quite different in appearance and character. It was very dark, mottled with gray and black; the cilia more conspicuous, probably owing to the dirt it had collected in crawling about the bough. This larva had recently moulted. I put it in with the others; and when in time it went down into the flannel to change its skin I watched for its reappearance with interest, wondering whether confinement would modify the colour. Its new coat was several shades paler than the skin it had cast; and by the time it was full fed its colour was exactly similar to the others.

In the early part of July I found several nearly full-fed larvæ on the trunks of trees—willow, Lombardy poplar, and one on balsam poplar (possibly this last larva may have crawled from a neighbouring willow, as it never touched the leaves of balsam poplar with which it was supplied, preferring the same fare as its companions). These larvæ were close against the tree, in little hollows in the bark; when touched they turned fiercely round, swinging their heads from side to side, intimating very clearly that they had a strong objection to being touched, and that they meant to do battle for their liberty. When I had got them safely off they continued to wriggle, trying to start from my hand, as if they had some dim consciousness of their future powers of flight. These,

during the time that remained until they were full grown, retained this intolerance of handling, differing altogether from those I had fed in-doors, which took no notice when they were touched or moved about, although I often tried to excite them into motion, so as to see their peculiar mode of walking. The wild larvæ generally hid themselves in the flannel by day, crawling out stealthily at night, as if they could not accommodate themselves to the idea that they need no longer take precautions against their out-of-door enemies. But more striking than this difference in disposition was that in colour: the wild larvæ were as dark as the smoky trunks they rested on; so different from the first six that hardly anyone, judging from colour alone, would have thought them identical.

Thus it is worth remarking that the larvæ of *C. nupta*, in the early part of their existence, when they are not strong enough to crawl far to their food, rest on the young willow twigs, which they closely resemble in colour. When they grow strong, and are too large to rest comfortably on the slender stems, they assume the colour of the trunks, so that they are always difficult of detection. Alone, this would not have much weight, as most larvæ have a tendency to become darker as they grow; but it is curious to find that these larvæ do not seem to grow darker when withdrawn from their proper surroundings, but that they adapt themselves to the colour of the object on which they rest.

It occurred to me that if I could put a young larva under the same conditions as to colour which would belong to it in a natural state, it would show the dark colour and markings of the wild larvæ. On the 14th of July I found a young larva on willow, so late in the season that I feared it might be ichneumonised. This ultimately proved to be the case. However, in hopeful ignorance, I put it alone into a glass pan, substituting soft black cloth for flannel to represent the colour of the tree trunk, against which it would rest: it had abundance of leaves, and was covered in with green net. Thus, as to colour, it was circumstanced as far as could be, as in nature. It was not to be expected that it would resemble the wild larvæ in disposition, having nothing to develop its jealousy for its own safety, though it might well be expected that it would assume their conspicuous markings. It grew slowly, gaining in colour steadily, till the time came for its last moult, when I hoped to see it as dark as it would have been in a natural state; but it remained so

long out of sight that I turned out the contents of the pan, and found it at the bottom, ichneumoned. It may seem hardly worth relating this experiment as it was incomplete, but that others may have better opportunities of learning whether bred larvæ may not be made to assume their proper colouring on supplying artificially the colour of their natural haunts. The larva of *C. nupta* is found during the whole of June; its life, in this stage, extending over a period of four or five weeks. I cannot speak more accurately, not having bred it from the egg.

Of *Biston hirtaria* I have only to say that a large number that I had from the egg were dull looking, of a brown colour, somewhat inclining to Indian red; the markings were not clear. It is just possible that this redness may be owing to their being kept in red earthenware pans. They would cling to their food with as much pertinacity as their wild brothers: these, which I often found nearly full grown on tree trunks, had all their dark chain-like markings. They are more conspicuous than *C. nupta*. Two only showed any remarkable difference; these were brought to me off lime, and were almost exactly the colour of the young lime leaves; so unlike the ordinary type of *B. hirtaria* that at first I was at a loss to identify them. Of these two larvæ one retained its peculiar tint till it went into the earth; the other, until I preserved it. The application of heat quickly brought it to the colour of the others that had been previously preserved, and from which I cannot now distinguish it.

I am not for a moment supposing that all larvæ kept in red pans should turn red, but that in *B. hirtaria* there is a wide difference in colour between such larvæ as have been kept in an unnatural condition and those that are found at large. Of these, a good specimen, with its dark, diamond-shaped markings, is anything but monotonous in colour, and has a good claim to beauty as it basks in the morning sun.

45, Elgin Crescent, December 21, 1877.

ENTOMOLOGICAL RAMBLES, 1877.

By J. B. HODGKINSON.

(Continued from p. 82.)

BEFORE the end of July I paid a visit to the top of Yewbarrow, Witherslack, to look up a lot of *Argyresthia aurulentella* and *A. dilectella* from the juniper. I beat

scores of bushes, only to dislodge an odd one now and then, and these were no sooner in the umbrella than they were blown out again. However, by "pegging" at it, I found odd bushes in sheltered corners that yielded as many as I cared for. The same occurred with *Macrochila marginella* the worst, scrubbiest bushes yielded most. Nothing else turned out, only odd *Zelleria hepariella*; and on the grass beneath, a little white speck now and then was seen; these were the little delicate *Elachista triseriatella* at rest, a perfect little ermine (*Yponomeuta*) in the markings and general appearance.

I now paid a visit to our marshes for *Crambus contaminellus*, from the last week in July to end of the first week in August, and only got twenty-eight specimens—about one evening's work. There was one remarkable circumstance some years since: every veneer I took was *C. contaminellus*; now the same place yields twenty of the common *C. tristellus* to one of the former. The *Crambidae* begin to fly about nine o'clock in the evening most freely, and long after dark, in the bare marshes. One seldom gets a calm night. I had one only, and then I met with twenty-four specimens of an *Elachista*(?), which I think will want a name. It is identical with specimens I took at Howth, and near Fleetwood, some years ago. I hope to breed it, as I have now the larvæ feeding. The same night a light *Tortrix* flew past me; it was too dark to see what it was, but I felt pretty sure it was *Eupacilia manniana*. I was anxious to settle when I got home whether I had the prize or not: however it turned up a pretty fair male *E. manniana*. This was quite five weeks late.

I found moths scarce everywhere, so I set off to Arnside, a nice little village on the opposite side of Morecambe Bay to Grange, a place in which I had never collected, to enjoy myself and prospect about, and be for once a prospective idler, so that when good moth times come again I should know the country. I mounted the hill behind the village and hit a yew tree, and out flew *Eupithecia sobrinata*, I might say by the dozen; they were so abundant that I ceased to hit either the yews or the juniper; they were such a pest, quite a contrast to the opposite, Witherslack, side. The sun came out, and here was flying freely *Amphysa gerviniana*, and *Peronea aspersana* in profusion. I had my net in my pocket (never without), and a few scores of boxes that were soon filled. A couple of days later I went well

stocked with both big and little boxes, as I saw *Erebia Blandina* were stretching themselves, quite limp and in such splendid order that I could not help taking a nice series: one, with a pale yellow patch instead of the brown in the upper wing. Now comes a clap of thunder; all goes dark around, and I had to begin to look for a place of shelter. A heavy shower; and then all is quite calm. Now the moths are all alive, and so am I. Whilst sheltering I was watching among some *Rosa spinosissima*, expecting *Spilonota amœnana* to turn up. I was soon amongst them, and boxed about a score. The day still keeping dark I found an old crab tree, I may say, full of *Argyresthia andereggiella*; I boxed eighty, as quickly as I could keep at work, they were so easily seen on a dark day; but when the sun is bright you cannot see this silvery species at all. Next I gave a thump at a young oak: a moth darts out to the ground. I follow it, thinking it is a flight that I had not seen for years: there it was—a splendid male *Stilbia anomala*. It seemed to know I was looking at it: up it got, and made a dart over a stone wall; but my net secured it. I saw another, but lost it. *Larentia olivata* was in abundance, but worn.

Another visit, about the 12th, I went to look for *Lycœna corydon*—to see it alive; but no luck. It used to abound along with the *Erebia Blandina*, but none have been seen for years, I am informed. However, I took *Ephippiphora signatana*, *Cleodora cytisella*, and *Gelechia rhombella*; the two latter first time in the north. *Elachista adscitella* was in abundance. Altogether Arnside seemed to be the best place for numbers that I had been at.

Last year, a week later, when it was blowing a gale, Mr. Threlfall and I found several *Yponomeuta plumbella* sheltering beneath a spindle tree; and on the top of Arnside Knot, in a fir wood, some very fine dark *Plutella cruciferella*, a queer place for a turnip feeder. By the way, a young friend of mine took twelve *Argynnis Adippe* and one *Thecla betulæ* one day, at Arnside.

The junipers in this district grow to twelve feet high, and are capital shelter for moths. There were plenty of *Argyresthia aurulentella* and some *Coriscium cuculipennella*. The fine fir woods, also, will no doubt yield well with a good season.

(To be continued.)

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropaischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 88.)

Fig. 82.—Galls of *Andricus amenti*: natural size and magnified.Fig. 83.—Galls of *A. occultus*.

82. *Andricus amenti*, Gir.—The small, inconspicuous gall may be found about the middle of May, attached to a male flower of *Quercus sessiliflora* or *Q. pubescens*. It is oviform, sharply rounded at the base, somewhat elongate, and bluntly-pointed at the unattached end. It is at the most 2 millimetres long and 1 millimetre thick. At first greenish, then brownish in colour, and tolerably thickly covered with bristly, simple and short, yellow hairs. It is not succulent, thin-walled, and contains a large larval chamber without an inner gall. Dr. Giraud's opinion, that this gall is developed from a stamen, admits of no doubt, as we often find the altered portions of the anther, sometimes peculiarly formed (for instance, in the shape of two slight swellings divided by a furrow), on the side of the upper half of the gall; so that, therefore, the stamen with the connective is changed into the gall. The gall appears singly or in great numbers on a catkin with the male flowers: at the fall of the bloom these catkins are generally fresh, and often somewhat thickened; the stalk is also not uncommonly bent at the spot where the galls occur. The yellow gall-flies bite themselves out, through the rind of the gall, during the latter half of May or beginning of June; while the galls themselves, often together with the stalk, remain on the tree the whole summer.—G. L. MAYR.

This little catkin-gall, which from its size would readily escape observation, has already been recorded as British. Dr. Giraud obtained the gall-flies by thousands from the 16th to the 24th of May, but I find no mention of any parasites.—E. A. FITCH.

83. *Andricus occultus*, Tschek. (Verh. zool. bot. Ges., 1871, p. 797).—In the latter half of May, when the stamiferous catkins of *Quercus pubescens* are generally fully developed, we may sometimes find some which are still undeveloped. This catkin bloom, on account of the non-development of the flower-stalk, becomes spherical, and is more or less surrounded, at the base as well as at the sides, by the divided but crowded bud-scales. If we now remove a portion of the anthers and perianth, so that the flower-stalk is laid bare, we shall see one to three reddish brown galls, of about the size of a millet-seed, in the middle of the catkin, generally on the top of the slightly-thickened stalk, which is only from 2 to 2·5 millimetres long. When the flower-bud produces more than one catkin, either each of them contains one or two galls, or the one producing galls remains spherical, whilst the others become fully developed. The gall itself is very like that of *Andricus amenti*. It is 2 to 2·5 millimetres long, oviform, pointed at the upper end as well as at the base, reddish brown; at the base it is smooth, or covered with small, extremely short, stiff bristles, whilst on the upper half it is thickly covered quite to the apex with long, rather soft, red-brown and yellow hairs. Perianth leaves may often be found springing from the gall, but I can detect no anthers. The periphery of the gall, like that of *A. amenti*, is thin, and encloses the larva chamber, or inner gall. The gall-fly leaves the gall in May, during the blooming time.—G. L. MAYR.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

VANESSA ANTIOPA IN SURREY.—A friend of mine, Mr. Bodkin, who is an artist in this neighbourhood, has to-day brought me a remarkably fine specimen of *Vanessa Antiopa*, which he caught, on April 5th, in a wood about four miles from this village. It is very perfect, and none the worse for its winter hibernation.—E. CAPRON; Shere, near Guildford, April 16, 1878.

COLIAS EDUSA IN APRIL.—On April 18th, this year, I saw

on the banks of the Great Western Railway, between Reading and Oxford, three specimens of *C. Edusa*; also one of *Gonepteryx rhamni*.—E. H. MAYCOCK; 22, Clemens Street, Leamington.

[Three specimens of *Colias Edusa* also seen at Ryde, Isle of Wight, by Mr. Liveridge, on the 22nd April.—Ed.]

REVISION OF THE HESPERIDÆ.—In the current part of the 'Stettiner Entomologische Zeitung' there is an excellent monograph of the *Hesperides* of the European fauna, by Dr. A. Speyer (vol. xxxix., pp. 167—193). The views there expressed do not appear to emanate from any sensational love of change, or to establish any arbitrary or whimsical arrangement; but the conclusions are arrived at after the careful study of the structure of most of the known forms. From this it is very probable that his generic distinctions will be adopted till our, at present, somewhat meagre knowledge of this neglected group of butterflies is increased. An analytical table of the genera is given, but for present and practical purposes it will suffice to indicate to which of these genera the British species are relegated. This is, perhaps, the more necessary, since even the three genera of Doubleday's list are ignored in 'British Butterflies;' Newman, with some misgivings (B. B. p. 169) followed Herrich-Schäffer in keeping the species all under *Hesperia*. Dr. Speyer divides the group into nine genera, one only of which is new, though others are restricted and altered. Amongst these the forty-one species are rather unequally divided. Our British species occur as follows:—

CARTEROCEPHALUS, *Led.*

Palæmon, *Pall.* = *Paniscus*, *Fab.*

THYMELICUS, *Hub.*

Thaumas, *Hufn.* = *Linea*, *W. V.*

Actæon, *Rott.*

PAMPHILA, *Fab.*

Comma, *Linn.*

Sylvanus, *Esp.*

SCELOTHRIX, *Ramb.*

Malva, *Linn.* = *Alveolus*, *Hub.*

NISONIADES, *Hub.*

Tages, *Linn.*

EDWARD A. FITCH.

HELIOTHIS ARMIGERA IN GLOUCESTERSHIRE.—I caught a specimen of *H. armigera* in my felt hat at one o'clock in the day, on August 29th, near Wootton-under-Edge. It was flying (looking almost white) in the broiling sun, among the long bent grasses that cover the sides of our hills. I had no

net or box with me, and the insect was in consequence considerably damaged. The moment of capture I thought it was *H. peltigera*, but found out it was not when I got home, having that insect in my cabinet. The specimen has since been identified as *Heliothis armigera*.—V. R. PERKINS; 54, Gloucester Street, Pimlico, April 4, 1878.

A RUN TO EPPING FOREST.—On Easter Monday I went down to Chingford, where I arrived about 12 a.m. I walked over to Fair Mead Bottom, which I found terribly wet from the effects of the late heavy rains. The weather, however, being warm, I put up my net, and went to work tapping the bushes for *Micro-Lepidoptera*. I took a fine series of *Perittia obscuripunctella* and *Chrysocoris festaliella*; and from the numerous *Elachista pollinariella*, which I disturbed, I secured one beautiful female. I also met with the following:—*Swammerdamia comptella* and *S. pyrella*, *Incurvaria masculella*, *Lithocolletis corylifoliella*, and one or two other *Lithocolletis* which I have not yet examined. A fair specimen of *Anticlea derivata* flew out; and a female *Aleucis pictaria*, which I have retained in the hope of getting eggs. —WILLIAM MACHIN; 22, Argyle Road, Carlton Square, E., April 25, 1878.

BOTYS TERREALIS BRED.—On March 4th I went into my breeding-room,—a very cold one, with seldom any sun; judge of my surprise at seeing a fine *B. terrealis* at rest on the window. At the same time I saw the larva crawling about in my flower-pots: I fancy it is one that should have come out last July. Finding this led me to look in my jars and other breeding apparatus, when I saw *Eupithecia pumilata* had ventured out also.—J. B. HODGKINSON; 15, Spring Bank, Preston, April 1, 1878.

INTOXICATED INSECTS.—During the fine and glorious evenings which we experienced in July, 1876, I was somewhat amused by the nocturnal visits of a certain *Tryphæna pronuba*. While collecting at sugar in the early part of the month, a friend called my attention to this peculiar but ragged individual, which was fully enjoying our sweets. In due course he became intoxicated, and had to give way to the obvious result; but naturalists tell us that alcohol acts upon the lower forms of animal life exactly in the same way as it does upon man. Now if we admit this, then we have a right to believe that its excessive use will tend to shorten an insect's life: whether it was so with this *pronuba* is a question that puzzles me, as for more than three weeks this dissipated character took every opportunity of using our sugar, and

there we found him five or six times a week as drunk as usual. However, I am inclined to think that the alcoholic mixture nourished him, so much so that he lived to a longer period than the usual term; and probably his career was then cut short simply by the ravages of some insectivorous creature.—H. T. DOBSON, JUN.; New Malden, Surrey.

[We remember trying sugar every suitable night through a mild winter, and seeing a certain specimen of *Cerastis vac-cinii*, which we had marked, at the sugared tree on upwards of fifty occasions, and only lost sight of it about the middle of April.—ED.]

GREEN HAIRY LARVÆ.—At the February meeting of the Entomological Society Sir John Lubbock is reported to have read a paper "On the Colouring of British Caterpillars," in which he stated that no hairy caterpillars are green. Now I think this is trying to prove too much. A not uncommon variety of the larva of *Acronycta leporina* is a beautiful pale green, covered with rather long, soft white hair. Again, I suppose Sir John would call the caterpillar of the emperor moth, *Saturnia pavonia-minor*, a hairy caterpillar: this, when full grown, is always some shade of green. At the same meeting Sir John stated that the bright coloration and hirsute jacket of hairy larvæ acted as a warning that the species was inedible. How is it, then, that the cuckoo seems to prefer hairy and bright-coloured larvæ to smooth ones? Last autumn, when staying at Tresco Abbey, in the Scilly Isles, I was informed that a few years since a bee-eater, *Merops apiaster*, visited the islands in the autumn, and remained for some time. Its principal food was the larva of the fox-moth, *Lasiocampa rubi*, one of the hairiest of hairy larvæ. It was frequently seen to seize the larvæ, beat them to death against the ground, as a thrush does a worm, and then swallow them whole.—[Rev.] H. HARPUR CREWE; Drayton-Beauchamp Rectory, Tring, April 5, 1878.

NOTE ON DR. POWER'S LIST OF THE ADDITIONS TO THE BRITISH COLEOPTERA DURING THE YEARS 1872—77 INCLUSIVE. — In Dr. Power's list of the new species of British Coleoptera added to the list from 1872 to 1877 inclusive (Entom. xi. 62), no mention is made of several species that I think ought to find a place therein. It is true three of these (*Homalium testaceum*, *Psammodytes porvicollis*, and *Thyamis ferruginea*) have already been on our lists, but either erroneously determined or of more than doubtful British origin, and are noticed as such by Mr. E. C. Rye in Entom. Annual

for 1872, and for the same reason are not included in Dr. Sharp's 'Catalogue.' The following seven species are not mentioned in Dr. Power's list:—

1. *Homalium testaceum*, Er.—E. C. Rye, Ent. An., 1873, 83. R. E. Bull. London district.

2. *Trichopteryx seminitens*, Matth.—A. Matthews, Ent. Mo. Mag. xiv., 36.: described.

3. *Ptilium marginatum*, Aubé.—A. Matthews, Ent. Mo. Mag. xiv., 36. Cambridge and Norfolk fens.

4. *Anisotoma pallens*, Sturm.—E. C. Rye, Ent. Mo. Mag. x., 135; Ent. An., 1874, 86. J. J. Walker, Deal; three examples, Sept. 19, 1873.

5. *Psammodius porcicollis*, Illig.—J. J. Walker, Ent. Mo. Mag. xii., 62 & 108. Whitsand Bay, Cornwall; several examples.

6. *Apion Ryei*, Black.—T. Blackburn, Ent. Mo. Mag. xi. 128: described. Shetland Isles, July, 1874.

7. *Thyamis ferruginea*, Foud.—E. C. Rye, Ent. Mo. Mag. xii., 180. E. C. Rye and G. C. Champion. (One example, Caterham, July, 1873).

Dr. Power remarks of *Tribolium confusum*, Duv., "no doubt introduced." No one will probably dispute this; still the remark would apply equally well to *T. ferrugineum*, Fab. The two species are about equally common in collections, and are often found in company. *Scopæus subcylindricus*, Scribe, can at present hardly be numbered among British species, like some others (*Apion scrobicolle*, Gyll., *Magdalinus Heydeni*, Desb., and *Ceuthorhynchideus Crotchii*, Bris.), ascribed to Britain by continental entomologists. It requires "further verification." Additional localities for the following species, included in Dr. Power's list, seem worthy of note:—*Harpalus 4-punctatus*, Dej., Aviemore, Inverness-shire; *Anisotoma macropus*, Rye, Tilgate; *Liosomus troglodytes*, Rye, Chatham (J. J. Walker); *Nanophyes gracilis*, Redt., Tilgate, in profusion, August, 1875; and *Orchestes semirufus*, Gyll., Woking, not rare on wild cherry.—G. C. CHAMPION; 274, Walworth Road, London, April 9, 1878.

RANATRA LINEARIS —In the April number (Entom. xi. 95) this water-bug is mentioned as having been found very injurious to carp-spawn. It may be of some interest to mention that a specimen accidentally introduced into an aquarium, in water procured from a pool not far from Isleworth (I rather think from Wandsworth) did much harm to the small English

fishes confined with it, but had left the gold-fish (up to the time when I examined them) entirely free from attack. I have not myself seen the *Ranatra* in the act of preying on its victim; but the owner of the aquarium, who is a careful observer, informed me that it selected any point indifferently, simply digging its rostrum well in, and holding firmly with its legs, for which the long, curved, though clawless tibiae and tarsi of the first pair are especially adapted. — E. A. ORMEROD; Dunster Lodge, near Isleworth, April 13, 1878.

BOOKS ON BRITISH HYMENOPTERA.—In reply to Mr. W. Gardiner, who asks for information on this head, if he thinks of studying the entire order of *Hymenoptera* he would require quite a small library. In Westwood's Introduction he is referred to all the standard works. If he intends to imply the *Aculeata*, Shuckard is good as regards generic description, &c.; but his descriptions are of generic distinctions, and are elaborated with mere specific differences. Of specific descriptions there are none. Therefore Mr. Gardiner wants the last edition of 'British Bees,' by Mr. Frederick Smith; and also the 'Catalogue of British Fossorial Hymenoptera—*Formicidæ* and *Vespidae*,' published by the Trustees of the British Museum in 1858; also by Mr. Smith. For the *Ichneumonidæ*, Gravenhorst's '*Ichneumonidæ Europææ*;' there is no work of the kind in English. The gall-flies he will find in the 'Entomologist;' there is no separate work complete in English.—ED.

CAMBRIDGE ENTOMOLOGICAL SOCIETY.—This Society held its twenty-sixth Annual Meeting on February 8th, 1878, when the officers were elected for the coming year, and the Treasurer presented his statement of accounts, which showed a substantial balance in the Society's favour. The number and destination of the excursions, which ought to be of a most interesting character, considering the localities chosen, was arranged. Mr. W. A. Forbes, of St. John's, Cambridge, the Honorary Secretary, requests us to notice this Society, with the object of its becoming better known. We have great pleasure in doing so, and at the same time wish its already long career and success may be extended for many years.—ED.

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NOTES ON CERTAIN PARASITIC FUNGI WHICH ATTACK INSECTS.

By F. BUCHANAN WHITE, M.D., F.L.S.



MAMESTRA BRASSICÆ.

I RECENTLY received (through Mr. Carrington) from Mr. H. Sharp, of 16, Huntsworth Terrace, Portman Market, a sketch of a dead larva attacked by a parasitic fungus. In his letter he says that while examining a fern case, last autumn, he found the larva of *Mamestra brassicæ* with fungus attached, of which a figure is given above.

Mr. Sharp's fungus is the conidiiferous condition of a species of *Torrubia*, a genus of fungi of which most of the species are parasitic upon insects. The order Lepidoptera is not the only one attacked by species of this genus, for there are records of at least four other orders, *viz.* Coleoptera, Orthoptera, Hemiptera, and Hymenoptera, having been attacked. One of the earliest accounts of such an occurrence appears in the Philosophical Transactions (for 1763) of the Royal Society, and as it is rather curious I will copy it:—"The vegetable fly is found in the Island Dominica, and

(excepting that it has no wings) resembles the drone, both in size and colour, more than any other English insect. In the month of May it buries itself in the earth, and begins to vegetate. By the latter end of July the tree is arrived at the full growth, and resembles a coral branch, and is about three inches high, and bears several little pods, which, dropping off, become worms, and from thence flies, like the English caterpillar." The animal attacked is supposed to be the larva or pupa of a *Cicada*, and the fungus *Torrubia sobolifera*: but of course the incidents of the latter part of the story are all or mostly imaginary.

The conidiiferous state of certain *Torrubiæ* are like some of the mould fungi, and bear the spores, or seeds, attached to threads, which are often massed together to form branching clubs, mealy on the surface from the numerous globose spores. When in this state they were once referred to the genus *Isaria*, which belongs to a different family of the fungi. In the higher, or *Torrubia*, condition, which they may or may not reach (for in the lower, or *Isaria*, otherwise conidiiferous—so called from their bearing the kind of spores termed conidia—condition, the plants reproduce their species), the appearance of the plant is quite different, as it is provided with a stalk, or club-shaped head, often more or less red in colour, and in which the rod-like sporidia (as the seeds in this family are termed) are produced in certain receptacles called perithecia.

As far as I can judge from the description and figure of Mr. Sharp's fungus it *may* be *Isaria farinosa*, the conidiiferous state of the bright red *Torrubia militaris*, which is said not to be uncommon upon pupæ, but is, I think, certainly commoner in the *Isaria* than in the *Torrubia* state, which I have never found. I say it *may* belong to that fungus; but without actually seeing the specimen it is impossible to be sure, as several other species occur in this country. Amongst these are *Isaria arachnophila*, which I have found on dead spiders; *I. sphingum*, a new British species, recently recorded from Kincardineshire, where it was found on dead lepidopterous pupæ; *Torrubia entomorrhiza* and *T. gracilis* upon dead larvæ and pupæ; and *T. myrmecophila* on ichneumons, &c. Then in other countries have been found *T. melolonthæ* upon the cockchafer, *T. carculionum* upon weevils, *T. caspitosa* upon grasshoppers, *T. Miquelii* and *T. sobolifera* upon *Cicadas*, *T. Taylora* upon Australian caterpillars; the well-known *T. Robertii*, so often seen in museums, which is found on the larvæ of the New Zealand *Charagia*, or

Hepialus, virescens; and several other species; making in all about twenty-five known to be parasitic on insects.

The cryptogamic parasitism of insects is a subject of which in reality we know very little. In some cases we know that the parasite attacks the living insect; in others, as in the case of some of the above-mentioned *Torrubiæ*, it seems uncertain whether the parasite confines its attentions to dead insects; though as certain *Torrubiæ* have been seen on living insects it is probable that it does not.

This parasitism is not a subject having scientific interest only, for as in the case of the disease of the silk-worm, termed muscardine,—the result of the attack of the fungus, *Botrytis bassiana*,—it sometimes causes serious commercial loss. This, or a similar, fungus sometimes attacks other larvæ, e.g. *Bombyx rubi*. Then there is another cryptogamic plant, known variously as *Empusa*, *Sporodonema*, or *Entomophthora*, the attack of one species of which—the *E. muscæ*—upon house flies, in autumn, must be familiar to everyone, though they may not know what it is. The fly attacked settles upon the wall or window and there dies, remaining, however, attached in a life-like position. A close examination will show that not only is the fly filled with fungus, but that the spores have been shed, and form a kind of halo round it on the surface on which it is standing. Fungi of this class have been noticed attacking wasps, as well as *Aphides*, and certain lepidopterous insects,—as the larvæ of *Chelonia Hebe*.*

A great deal remains to be investigated as to the nature of these fungus parasites of insects, not only as to the various species of fungi and the various states they pass through, but as to what insects are attacked, how the fungus gets access to them, how its ravages in the structure of the insect are carried on, and what are the causes which predispose an insect to be so attacked, &c. When we know all this, who shall say that a great deal of light may not be thrown upon certain diseases of the higher animals, including man himself?

For the preservation of his specimens I should recommend Mr. Sharp to pin them into a glass-lidded box (in which a drop or two of carbolic acid may be put), and not to subject them to too much direct handling.

* The fungus which has recently caused such woeful destruction amongst the salmon and other fish in the rivers of the north of England, is a member of this class. Botanists have not quite made up their minds whether these plants are fungi or algæ.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. VIII. NYMPHALIDÆ—NYMPHALINÆ. ARGYNNIS, AND ALLIED GENERA.

THE *Nymphalinæ* consist of a number of well-defined genera, which it is difficult to group into sections, but which, as they are too numerous to treat of as a whole, we will deal with by the use of artificial groups founded on a certain amount of general resemblance to some well-known genus; and in the present paper we will discuss the genera allied to *Argynnis*. The atrophied front legs, combined with the open hind-wing cells, are characters sufficient to prevent the *Nymphalinæ* being confounded with other butterflies.

The two first genera, *Colænis* and *Dione*, are long-winged South American butterflies, whose real affinities are with the *Heliconinæ*. Their colour is usually fulvous, more or less banded or spotted with black. The species of *Colænis* measure about three or four inches across, and the under side is either coloured as above, or indistinctly marked. One species, *C. Dido*, differs from the others in being of a beautiful green, with black markings above, and brown and silvery ones below. It may be known at once by the whole cell of the fore wings being filled up with green. The species of *Dione* have shorter and broader fore wings (except *D. Juno*, which more resembles *Colænis* in shape), and are rich fulvous, spotted or veined with black, and the hind wings and the tips of the fore wings are covered with oval silvery spots beneath. In *D. Vanilla* even the black spots in the cell are centred with silvery beneath; and in *D. Moneta* and *D. Glycera* the basal half of the fore wings is pale crimson on the under side.

Turning now to the *Nymphalinæ* proper we commence with the East Indian and Australian genus, *Cethosia*. It contains a number of closely-allied and very similar species, which may be distinguished from any other genus by the elegant festooned black and white marginal markings, especially on the under surface of the hind wings. They somewhat resemble *Danai*; and indeed some species appear to mimic *D. Chryippus*, and others of the genus *Danaus*. The *Cethosia* are black, generally with a white or yellow band or white spots or lunules across the tip of the fore

wings, and with more or less of the hind wings and of the inner margin of the fore wings filled up either with greenish white or with some shade of tawny or fulvous, and generally marked with rows of black spots. Occasionally the pale portion of the wing is beautifully shaded with purple; and the sexes usually differ considerably, the males being often fulvous or tawny, while the females are greenish white. These insects generally average about three inches in expanse.

Some of the largest and handsomest species among the genera most resembling *Argynnis* belong to the genus *Clothilda*, which is almost confined to Cuba, Haiti, and Central America. They expand about four or five inches, and are tawny, with rows of large black spots towards the hind margins; and one species, *T. Thirza*, Hübn., has deep red markings towards the base. On the under side of the hind wings they are dark brown, without silvery spots, but marked with many slender undulating white lines.

The genus *Terinos*, from the Malay Islands, expands about two and a half or three inches, and is dark brown, more or less suffused or striped with rich purplish blue. The tips of the fore wings are prominent, but obtusely rounded, and the hind margin is suddenly concave below them. The hind wings are nearly square, slightly dentated, and with a more or less prominent projection at the outer angle; towards the hind margin they are generally varied with white or yellow.

Cirrochroa is another East Indian and Australian genus, with less prominent tips, below which the hind margin slopes gradually to the hinder angle. The hind wings are slightly and regularly dentated and curved. The wings are tawny, more or less bordered with black, especially towards the tip of the fore wings; the females of some species are brown. There are generally two dentated submarginal black lines, and a third near the middle of the wings; outside the latter (which is often silvery on the under side) runs a row of brown dots. These insects usually expand from two to three and a half inches; but the smallest, *C. fasciata*, Feld., from Borneo, expands only one inch and a half, and differs much from any other species, being brown, with a broad ochreous band running from the middle of the fore wings to the inner margin of the hind wings, beyond which are two rows of ochreous lunules, the innermost becoming a stripe on the hind wings.

Lachnoptera Iole, Fabr., from West Africa, much resembles *Cirrochroa*, but the tips of the fore wings are less prominent, and the hind wings are broader; it expands about two inches and a half, and is tawny, with a double festooned submarginal line, and traces of a third, broken into lunules. The hind wings have a very large patch of raised brown scales on the costa, and the black spots are centred with silvery beneath, and edged inside with an irregular silvery band.

Cynthia Arsinoe, Cram., is an insect expanding from two and a half to four inches across. The hind wings are nearly square, with a projecting angle or short tail, and with two eye-spots towards the hind margin. The male is tawny, with a nearly straight brown band running from the middle of the costa of the fore wings to the anal angle of the hind wings; on the under side it is joined by an oblique band running from the tip of the hind wings to the anal angle, just within the eyes. The female is greenish brown above, with a broad whitish band crossing both wings, and growing narrower towards the inner margin of the hind wings. This species is very common in the East Indies, and is also found in Africa. It is either very variable, or there are several closely-allied species.

The next three genera, *Messarax*, *Atella*, and *Euptoieta*, are of small extent, and contain species expanding about two or two and a half inches. The hind wings are rounded and scalloped, generally with a slight angular projection in the middle, which is prolonged into a short tail in *Atella Egata*. The fore wings are rather broad, with the costa more or less arched, and the hind margin is either almost straight or slightly rounded in *Messarax*, and slightly concave in the other genera. The species of *Messarax* are tawny brown towards the base, with a broad straw-coloured or orange band across the fore wings, and sometimes the hind wings also; the latter are frequently marked with a row of dark spots, within which is a bluish or lead-coloured line above, which is silvery below. The tip of the fore wings is broadly brown; and in the common Australian *M. Modestes* the borders of all the wings are deep black. *M. Erymanthis* is a common East Indian species. The others chiefly inhabit the Moluccas and the Papuan Islands. The species of *Atella* are chiefly Indian or Papuan. *A. Phalanta* is uniform fuscous, with the wings edged with festooned lines, within which is a row of black spots on all the wings, and the cell

is transversely striated with black: it is common in the East Indies and Africa. The other species (some of which have short tails) may be known from *Cirrochroa*, *Messaras*, &c., by the transverse striations in the cell of the fore wings. *Euptoieta* only contains two common American species, resembling *Atella Phalanta*, but the veins of the fore wings are black, especially in *E. Claudia*; and instead of the wings being edged by festooned lines they are edged by a double brown line, separated by rather long fulvous spots: within this runs a row of large black spots, placed between the nervures; and within this again an obsolete dark line on the fore wings, and an oblique and very irregular black line on the fore wings.

We now come to the genus *Argynnis*. It is numerously represented in Europe, Asia, and North America; but in Africa only on the North coast, and in South America only in Chili. Among the most striking of the larger North American species are *A. Diana*, with a black male, broadly edged with orange, and a green female spotted with whitish; and *A. Idalia*, which has reddish fore wings and blackish hind wings, with two rows of whitish spots. There are several Californian species, with yellowish instead of silvery spots on the hind wings beneath. Among East Indian species we may mention *A. Niphe*, with a fulvous male, and a female which mimics *Danaus Chrysippus* on the upper side. The hind wings are green beneath in both sexes, with slightly silvery markings. Then there are the Indian *A. Childreni* and *A. Kamala*, with the hind wings green beneath, striped with silver; and the North Chinese *A. Sagana*, the male of which resembles *A. Paphia*, while the female is olive-green, marked with white, like an *Apatura* or *Limenitis*, and was actually established as a new genus when first discovered. I have nothing special to say about the smaller group of *Argynnis*, except that it is to this that all the circumpolar, or South American, species belong.

Melitæa is common in Europe, Asia, North Africa, and California; the greatest variety and the largest known species are Californian. Many of these are black, with several transverse rows of yellowish spots, sometimes alternating with reddish ones, thus forming a higher development of the group represented in Europe by *Maturna* and *Aurinia*.

Most of the smaller tawny *Nymphalidæ* of North and South America belong to the genus *Phyciodes*, many of which closely resemble *Melitæa* above, but the under side of

the hind wings is yellowish or grayish, without sharply-defined markings. Others have very long wings, and closely resemble small *Heliconii*, or *Eucides*, being marked with black and tawny in a similar manner. Others are black, with white spots on the fore wings, and a broad white band on the hind wings. *P. Castilla* is black, with a red transverse bar across the middle of the fore wings; and *P. Leucodesma*, which is common at Trinidad, is brown, with the greater part of the wings occupied by a broad transverse white band, interrupted below the costa. The short-winged species are mostly rather smaller than an average *Melitæa*; but the long-winged species are larger, and occasionally exceed two inches in expanse.

Microtia Elva, from Central America, is a small black butterfly, about an inch in expanse, with a tawny band running from the anal angle of the hind wings to the middle of the fore wings; beyond it is a transverse tawny blotch of the same colour. *Gnathotriche exclamationis*, from Venezuela, resembles an *Archonias* (*Pierinæ*) in appearance: it is a black butterfly, with a row of oblong yellow spots across all the wings, and a yellow basal streak on the fore wings, followed by a spot. It expands about an inch and a quarter.

The South American genus, *Chlosyne*, contains black species, expanding about two inches. The fore wings are more or less spotted with white, and the hind wings have generally a large red or yellow blotch at the base. The hind wings are rounded and scalloped, and the fore wings slightly concave.

Anemeca Ehrenbergii, from Mexico, expands about two inches. The wings are rounded and entire, and are smoky brown, with yellowish fringes; the nervures of the hind wings and of the hind margin of the fore wings are broadly yellowish beneath, and slightly so on the upper side also.

In my next paper I shall proceed to consider the genera allied to *Vanessa*; but in all succeeding articles I shall deal entirely with exotic insects, as I have done in the present chapter, noticing European species only so far as may be necessary to elucidate the others; and referring those who wish for information on European species, whether British or not, to my work on 'European Butterflies and Moths,' now in course of publication.

MODIFICATIONS OF GALL-GROWTH.

By EDWARD A. FITCH.



Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

IN the April number of the 'Entomologist' (Entom. xi. 82) attention was called to the little-understood subject of gall-growth and gall-structure by a consideration of two or three abnormal forms. The perusal of that interesting paper has suggested to me that it may not be untimely to call attention to various other modifications. Not the modifications and monstrosities occasioned through injury or wounds to the gall itself; neither those resulting from its position as to surrounding growths and objects, nor those which may be attributed to suppressed or stimulated growth. With these external developments, of each of which many curious forms could be instanced, the causes are, to a certain extent, explicable by the scientific or observant botanist, but with the modifications that are due to internal influences the case is different; and it is to these—to such as are occasioned by the life within the gall itself—that I wish to direct attention.

In order to make my subject clear, and limit my observations, I shall confine myself specially to the well-known galls of two species of *Cynipidæ*, viz.—*Cynips Kollari* (the common Devonshire, or marble, gall of the oak) and *Rhodites eglanteriæ* (the globular gall of the rose leaf).

Before treating of these, and to serve as a preface to my remarks, I may refer to two instances of abnormal tenancy in galls,—first that of an *Andricus*, then the common history of those frequent lodgers the *Synergi*. A common gall, occurring on oak-buds, is that of *Aphilothrix gemmæ*, which is generally known as the artichoke gall. It consists of a cupule, to which the more or less modified leafy scales are attached, with a peduncular oviform inner gall. The normal section is as at fig. 1; within the central inner gall the larva of the gall-maker lives. This inner gall is greatly modified by immaturely

discontinued growth through parasitism, to which it is unnecessary to refer further than to explain that fig. 2 shows the normal section of the perfectly-formed gall; and fig. 3 the same, inhabited by *Synergi*. Within this woody cupule several small oval, hard, but thin-walled chambers are frequently to be found. They are irregularly distributed; sometimes three or four are arranged side by side on the exterior of the woody growth; at others they are quite without any method, and I have found them as far down the twig, to which the gall is attached, as shown at A in fig. 4. It is these chambers that are the home of *Andricus trilineatus*. This is the only instance known of what is considered a true gall-maker being dependent on another. With this exception the galls and habits of *A. trilineatus* accord somewhat with those of its congener, *A. noduli*. The larva chamber in all single-celled or unilocular galls continues, under natural circumstances, single and hollow; but when these galls become tenanted, with those cynipideous inquiline of most of the cynipideous galls—the *Synergi*, they all exhibit in section several secondary chambers, divided by a thin vegetable septum. The study of these occasional growths is certainly necessary for correct views of the physiology of the gall itself.

Now to return to our more observable instances. First the production of *Cynips Kollari*. Its normal structure is a smooth, brown, spherical, woody or parenchymatous gall, containing a small more or less oval larva chamber in the centre (see fig., Entom. vii. 241): this is moderately hard, owing to the density of structure; the parenchyma—or what is perhaps more correctly described as merenchyma, from the openness of the structure—is entire, and radiates from it. Two internal and constant modifications occur. The first is when we find two or three chambers in the parenchyma of the gall (see figs. A and B): these are generally small, single, and invariably placed very near the base of the gall itself. The outward indications of this is small, as the gall appears perfectly normal, and the central larva chamber not being affected the life of the cynipideous tenant, or its parasite, is not interfered with. These chambers are inhabited by inquilines, mostly, if not exclusively, by *Synergus melanopus* or its parasites: their presence is to be discovered by a very minute swelling and slight discoloration (lighter) at the point affected; the perforature of oviposition is also observable in the rind. The second modification

and the most easily-recognised abnormal forms of *Kollari* galls are the half-sized, irregularly shaped, and slightly discoloured specimens which are so commonly met with, and which invariably lose their green colour (*i.e.* become ripe) later than normal specimens. In section these will show the larva chamber to be greatly enlarged and the whole structure altered: the parenchymatous tissue is hardened, and the surroundings of the central cavity is thick and hard; in fact the whole cellular tissue is condensed. This central cavity is filled with numerous chambers separated by thin septa, as before instanced in other cases of synergous tenancy: in these the *Synergus* larvæ reside. They are vegetable feeders, consequently the sap (plant juices) is appropriated by them, and the gall becomes dwarfed, and its tissues improperly nourished. Various forms of this modification occur, but it is unnecessary to particularise them: a section of one is shown in the accompanying figure (see fig. c).

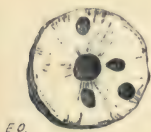


Fig. A.

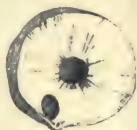


Fig. B.

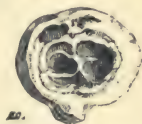
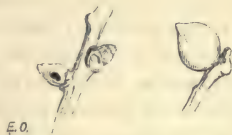


Fig. C.

Particularly small, thin-walled, woody, slightly pointed, conical galls are frequently met with amongst those of *C. Kollari*. These are, I believe, galls of that species modified by a species of *Synergus*: one egg is laid in the immature cell of *Kollari*, and, as before, the sap is appropriated by the tenant, but to a greater degree than in the former many-chambered instance. It is necessary to say that the history of the production of this form from *Kollari* is only surmise; its actual proof is difficult.

Small *C. Kollari* galls.

The production of *Rhodites eglanteriæ* is a thin-walled, globular, glabrous, green or rosy gall, occurring normally on the under side of the common wild rose (*Rosa* spp.): for section see fig. α . As an instance of the gall being unaltered,

notwithstanding its production on varied organs of the plant, I may say I have found galls of this species on the side veins, midrib, and leaf-stalk of the leaflet (upper and under side); on the petiole and stipule of the leaf; and even once on the fruit of *Rosa canina*: all perfectly normal forms. The constant modifications of this gall are two, both curious and interesting. Firstly—the whole interior becomes grown-up and irregularly filled with chambers; for section see fig. γ : the only outward sign is the gall becoming brown and covered with small scattered knobs. Secondly—the normal central cavity remains, but the wall of the gall becomes thickened and regularly divided into chambers; a section of a good specimen of this modification, with the peripheral chambers complete, is particularly striking and pretty: see fig. β . The specimens



Fig. α . Fig. β . Fig. γ .

are often abnormally large and, like the former, become discoloured, and the surface becomes less glabrous and more or less warty. These two modifications are due to a similar cause with those in the oak species, viz., the tenancy of phytophagous individuals. I am unable, at present, to say whether they are both attributable to the same species, for from specimens of both forms I have bred *Aulax canina*, *Eurytoma* sp., and various parasites. *Aulax*, which is closely allied to *Synergus* and has doubtless the same economy, is the primary cause of the modification; but as to the *Eurytomidae* it is an undecided question whether they are vegetable or animal feeders in the larval state.

The dwarfing of all galls through inquilinism and parasitism is well known and self-explanatory; but a consideration of the above-mentioned forms with those peculiar growths, mentioned in "Considerations of Gall-growth," may lead to some knowledge of the interesting, though still obscure, subject—the cause and growth of vegetable galls. In the animal kingdom we know that different irritants produce distinctly characterised effects, so in the vegetable kingdom we know that different species of insects produce different

kinds of morbid growths which are especially constant; but just as in animal disorders we frequently deal with the symptoms rather than with the evil itself, so in the vegetable world it is only by minute observation backwards, step by step, from the completed morbid growth that we can hope to arrive at its origin, and thence possibly at its cause.

Maldon, Essex, April 3, 1878.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.

By EDWARD A. FITCH.

(Continued from p. 115.)



Fig. 84.—*ANDRICUS QUADRILINEATUS*.

Fig. 85.—*A. PEDUNCULI*.



Fig. 86.

A. VERRUCOSUS.

84. *Andricus quadrilineatus*, Hart. 85. *A. pedunculi*, Schenck.—Professor Schenck, in his 'Beiträge zur Kenntniss der nassauischen Cynipiden und ihrer Gallen,' published in 1865, described a number of gall-species which are produced on the catkins of the oak, and which resemble one another in appearance very closely. Almost the whole of these forms he described from the specimens which are contained in Von Heyden's collection. Through the kindness of Herr v. Heyden I have been enabled to examine these types, so that I am now in a position to rectify some errors respecting those which belong here. Galls collected by me both last year and in the present still contain larvæ, consequently there has been no emergence. The species which I have taken into consideration are *Andricus quadrilineatus*, Hart., *A. flavicornis*, Schenck, *A. pedunculi*, Schenck, *A. ambi-*

gnus, Schenck, and *A. glabriusculus*, Schenck. From Professor Schenck's description in the above-cited work (pp. 111 and 112) it is easy to see that the galls themselves differ from one another, yet when I compare these types together and those galls which belong here, collected by myself from the same tree, I do not find the least substantial difference between them; still the matter might be otherwise if the *Andrici* preserved in Heyden's collection were put by together with the actual galls in question from which they were bred. It may, therefore, be judicious to retain the Schenckian species specially. *A. quadrilineatus*.—The gall is brown, smooth, oviform, three millimetres long by two thick; its periphery is uneven, as it is traversed with raised longitudinal stripes, which are more or less united; it might also be described as having moderately deep, partly interrupted and distinct partly confluent longitudinal furrows. The dried perianth may be found at the base of the gall, and there is a rather conspicuous papilla at the apex. The gall, when broken open, exhibits a very thin, oviform, yellow-coloured inner gall, which is attached through its whole surface to the reddish brown gall tissue: that this tissue was at first soft, and later on became dried, there can be no doubt, owing to the ridges and furrows with which it is normally covered. The insect gummed on the same paper as the gall is an *Andricus*, which agrees perfectly with Hartig's description of *A. quadrilineatus*. The types of *A. flavicornis* consist of ten galls and one *Andricus*; the galls do not differ at all from those of *A. quadrilineatus*. This is the opinion also expressed by Prof. Schenck; only I must remark, for the sake of accuracy, that in some of these the furrows here and there through being deepened have convex surfaces, so that by the drying of the gall tissue the inner gall becomes exposed at these spots. In other shrivelled specimens this also happened in different ways, and the appearances described above were only due to it being a later gathered gall. The typical *Andricus* is undoubtedly a different species from *A. quadrilineatus*. It certainly is possible, but is not probable, that two undoubtedly distinct insects should be bred from exactly the same species of gall from the same part of the tree of which the species is already known. We must leave it to time to clear up this difficulty, and so let both species remain at present, for I have no grounds for doubting the accuracy of the late Senator v. Heyden. The types of *A. pedunculi* are before me: they consist of a gall

and an insect on the same card, from v. Heyden's collection. The gall agrees exactly with those specimens of *A. flavicornis* which have narrow deep depressions between the ribs instead of the furrows. The *Andricus* (a female) is undoubtedly distinct, according to Prof. Schenck's description; but I have myself found no difference, notwithstanding a detailed examination; so will begin with Prof. Schenck's description, that the antennæ of the female of *A. pedunculi* are 14-jointed, whilst in *A. flavicornis* they are 13-jointed; however the former species has only 13-jointed antennæ. The thorax and abdomen, according to Schenck, are black in *A. pedunculi*, however they are coloured, just as in *A. flavicornis*. He says the scutellum is more or less pointed at the apex; however the typical specimen only shows at the most an undoubted partial enlargement of a fold, which is quite immaterial. There is, then, no difference either between the gall or the insect of the two species, *A. pedunculi* and *A. flavicornis*, so that I can accept them as distinct; but the name *A. pedunculi* must be retained, as Schenck has described this species first. Of *A. ambiguus* the gall only is known. Prof. Schenck was so friendly as to send me the types, which do not differ essentially from the other galls here described, with the exception perhaps that they are still red in colour, are both immature, and have altogether a fresher appearance. One specimen is altogether in accordance with the description given by Schenck, in that it is more nearly spherical, and is furnished with irregular, undulatory, narrow and sharp longitudinal striations; it is, however, more immature than the second specimen, which has thick, swollen, regular, straight striations, with narrow furrows between them, but it has also a stretched-out form. Of *A. glabriusculus* the gall only is also known: the five types from which it is described, from Von Heyden's collection, are before me. Two specimens agree perfectly with the galls of *A. quadrilineatus* and *A. pedunculi*; of a third specimen there is hardly anything but the inner gall existing, the greater part of the gall substance having gone. Two specimens are more clearly distinguished; they have only fine, irregular, faintly raised ribs, which run in a longitudinal and oblique direction, so that these specimens come very near to the next species (*A. verrucosus*), although that is described as doubtfully distinct. The galls collected by me from *Quercus pedunculata* (mentioned above) I cannot assign to any other species than *A. quadrilineatus*, Hart., or *A. pedunculi*, Schenck,

until I have succeeded in breeding the gall-flies. The galls were found in May, and were then, in the fresh state, succulent, as yet exhibiting no ribs; but in a few days partly shallow, partly deeper, longitudinal furrows were developed. They have now the same various appearances as the Schenckian types.—G. L. MAYR.

These galls are, I believe, common, and generally distributed in Britain, but unnoticed. Dr. Traill has found them in several localities in Scotland; and I have met with them in widely separated districts in Essex. Unless careful, we here get into great confusion of nomenclature. Like our common currant gall of the oak (*S. baccarum*) there are two forms of this species—the leaf form, and the catkin form. The description of the former has already been translated as a distinct species (*Aphilothrix marginalis*, Schlecht., Entom. x. 298); and of the latter, from above, we see how many are the varieties, which they certainly are, as is also doubtless the species next described. Of these the two chosen names of Schenck appear unfortunately to be *A. pedunculi* and *A. verrucosus*. *Pedunculi* was applied by Linné to the catkin form of *S. baccarum*; and *S. verrucosa* of Schlechtendal, a very distinct species, is described in the 'Entomologist' (Entom. x. 249). It is, therefore, certainly not only convenient, but necessary, that these two names, applied to the galls now under consideration, should be dropped, and that this species should be known as *Andricus quadrilineatus*, Hart., only. From these galls I have bred *Callimome auratus*, Fousc., a species of *Pteromalus*; and one specimen of another unknown *Chalcid*.—E. A. FITCH.

86. *Andricus verrucosus*, Schenck.—The typical gall, from Von Heyden's collection, is brown, oviform, with a longitudinal diameter of 5·2 millimetres, and a horizontal one of 3·5 millimetres; its surface exhibits wide, separate, soft, rather indistinct, slightly raised, longitudinal striations and irregularly placed warts; its apex bears a prominent papilla; it occurs on the catkin stalk, and the remains of the perianth and anthers may sometimes be recognised at the base. Whether this gall belongs to a distinct species, or is only that of *A. quadrilineatus* or *A. pedunculi*, modified by *Synergi*, is doubtful, for a *Synergus* only was bred from it.—G. L. MAYR.

Doubtless a variety of the former species. I do not find that Dr. Mayr has named the above-mentioned *Synergus*, or again referred to it.—E. A. FITCH.

NOTES FROM UTAH.

By the late ANDREW MURRAY, F.L.S.

[THE accompanying notes, of a few points of insect life round Salt Lake City, are taken from one of the letters written home by Mr. Andrew Murray during his Californian expedition in 1873, and will probably be read with interest by others, besides the friend and fellow-worker in his special field of Economic Entomology to whom they were originally sent, although merely slight observations (jotted down without any view to publication) of such matters as caught his attention in the intervals of business. The alteration of the climate by irrigation, and the, apparently, consequent attack of the sage-brush by gall insects, was a subject in which he took much interest, from its possible economic results eventually on the vast tracts useless, or almost useless, from the presence of the *Artemisia*. Of these galls he brought home many specimens, of which the different kinds are now represented in the economic collection at Bethnal Green.]

Of insects one of the most interesting is the large, black, slightly bronzy cricket, on which the Indians used to feed, and which nearly destroyed the early crops of the first settlers.

The beetles are mainly of the Europeo-Asiat. American type, very much like our own. I have three or four specimens of a *Carabus*, like *C. campestris*. On the margins of the streams plenty of *Peryphus*, *Bembidium*, and their congeners; but there is one difference in the largest *Bembidium*. With us they run with great swiftness in the hot sun; but this species on the smallest provocation opens its wings like a *Cicindela*, and flies off. It seems only to make a little flight, but I have never been able to see one alight. The *Cicindelas* in the warm days in the glens are in great numbers, but fly off so quickly that I have only got one or two: most of them are the common Eastern species, *C. repanda*. A slight element of Californian species shows itself:—a *Cremastocheilus*, two or three *Eleodes*, &c.; only one *Curculio*; two *Elaters*; and a fine burying beetle, like a magnified *N. vestigator*. There are plenty of dead mules and dead cattle, but they set fire to them here; and almost every little patch of cow-dung in the pasture has also been fired.

The butterflies are not numerous in species, but in the canons are tolerably plentiful in individuals. The commonest seems a small skipper, which I have not yet caught. Then the American variety of our Camberwell Beauty is next: it is very beautiful on the wing, and is so strong and solid and big that whether in passing you or in touching it, as in knocking it down, it feels more like a bird than a fragile butterfly; it has a way, too, of soaring or gliding about like a hawk or a swallow, that is, bird-like, although it tilts about, too, like other butterflies. Then there is a white, which I have not caught, but which I think will turn out to be a *Hipparchia*, like *H. Galathea*; one or two *Argynnis*; and an American species, which I recollect by head-mark, but not by name.

The poplars, or cotton-woods, in the streets, are terribly mangled by a *Cossus*: its holes are just like those of our own *Ligniperda*; but its chrysalids, of which the remains stand still sticking out of the holes, are more like those of the leopard-moth in size and appearance. The cotton-wood is a poplar with a white bark and a sharp brown bud; that is all I can say yet. I picked a twig two days ago with the ring of eggs of the lackey-moth round it, exactly like our own; and to-day on opening the bag, in which I had put it, I find the caterpillars had begun to come out,—little black, tiny things, like our own. It is a different species I know, from memory, but I forget its name.

Galls are numerous on the oak (a low-growing scrub-oak, called the burr-oak); even although leafless I have found three galls still lingering, two on the branchlets and a third in the axils of the buds and leaves; and I observe, both on these and on injured twigs of cotton-wood, and by the way-side, that the infested and injured twigs continue to bear the remains of their leaves while the normal twigs are leafless. The sage-brush (*Artemisia*? sp.) carries three galls. I think it is chiefly so affected in the neighbourhood of this city. There are three kinds:—one, the common sage-brush, that cattle will only eat in the last extremity, but which still keeps them alive; another kind, called white sage, which they like better, and on which they fatten; and a third. The reason of the prevalence of galls on it here (if it is really as it seems to me) may be that the plants are not thriving,—suffering from the improvement of the climate; for it seems that the cultivation and irrigation are producing a change in the climate. A brick-maker told me that “adobes,” or sun-dried bricks, could be made and used ten years ago when he

came; now they did not answer. The climate, too, was less severe in winter; rain had now begun to fall occasionally in summer; when he came there were no dews, now there are; while fifty to a hundred miles to the south beyond the settlement there is no dew yet.*

Salt Lake City, April 22, 1873.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

VANESSA ANTIOPA AT KEYMER.—*Vanessa Antiopa* was captured at Keymer, Sussex, by Robert Chatfield, on April 28th last. There is only one other recorded instance of this species having been seen there. This is evidently a hibernated specimen, and is a little worn.—M. CLIVE-BAYLEY; 56, Portland Place, London, W.

COLIAS EDUSA HYBERNATING AS A LARVA.—As a contribution to the life-history of this butterfly I will relate my experience during last winter. I had some larvæ, which were hatched in September. These fed all through the winter, except when very cold, when they became quite torpid, and seemed to be almost frozen. I started with thirteen, but these gradually died off; so that in February I was left with three in their last moult, and two small ones. Some thief of a bird, either a robin or a wren, got through a broken pane, and stole the three large ones at one time. I was then left with the small ones only, one of which unfortunately died; but the other fed on, and changed to a pupa on April 11th. On May 2nd this produced a fine female imago; so it was but twenty-one days in the penultimate state.—H. JOBSON; 7, Reform Terrace, Park Lane, Tottenham, May, 1878.

COLIAS EDUSA IN SPRING.—I have to record that three specimens of *Colias Edusa* were seen flying, on April 22nd, by Mr. W. H. Liversidge, while driving near Ryde. Does not this argue that the insect does hibernate as an imago, whatever it may do in the larva state?—COLLIS WILLMOTT; 194, Mare Street, Hackney, April 29, 1878.

[Briefly referred to in last number.—ED.]

* The "Reports on the Zoological Collections of Lieut. W. L. Carpenter, made in Colorado during the summer of 1873" (Washington, 1875), goes rather fully into the insect fauna of this district. Baron C. R. Osten Sacken, who notices the galls, refers to three species of oak-galls: some *Nematus* galls on willows; a species of gall formed by *Aphides* (*Pemphigus*) on the leaf-stalk of the cotton-wood, and from the pupa-shells, found inside the sage-brush galls, he refers the gall-maker to the genus *Trypeta*.—E. A. F.

COLIAS EDUSA IN MAY.—On Saturday, May 18th, I was walking up the Finchley Road, near Platt's Lane, when a fine *Colias Edusa* flew across the road within five yards of me. Shortly afterwards two more (apparently females) passed me; and later on in the day, between four and five p.m., I saw two others in a field, near the Willesden Lane.—R. T. GIBBONS; Chilton Villa, Loveridge Road, Kilburn, N.W., May 23, 1878.

FOOD-PLANTS OF GONEPTERYX RHAMNI.—In the 'Entomologist' for July, 1875 (Entom. viii. 160), there appeared a communication from me, wherein I stated that *Gonepteryx rhamni* had been reared from eggs deposited on "a scrubby *Alaternus*" growing in my garden. The shrub in question, having been invoiced to me under that name from a well-known nursery, I did not doubt the correctness of it until lately. On sending a piece, however to the garden department of the 'Field,' it was identified as *Maytenus Chilensis*. On looking it up I find that the genus *Maytenus* is closely allied to *Rhamnus*, especially to *R. alaternus* (which last species, by the way, I am told has been lately placed in a separate genus). *M. Chilensis* bears, in April or May (according to the season), a profusion of small greenish flowers having a strong perfume, which, although not particularly sweet, seems to have a strong attraction for insects, and most probably first drew the attention of the butterfly. Larvæ have been found on it every year since, and now there are several eggs waiting to be hatched.—N. C. TUELY; Mortimer Lodge, Wimbledon Park, S.W., May 6, 1878.

LEPIDOPTERA IN NORTH WALES.—On the 2nd of May I was working for Lepidoptera in the woods about Llanrwst, and was astonished to see *Lycana Argiolus* in abundance. By throwing stones at the holly bushes (which grow here to an immense height) I was enabled to induce the butterflies to make a descent. Owing to the difficulties of the situation I could only manage to secure eight females and one male, but must have missed quite a score more. I took also *Tephronia biundularia*, at rest, on the larch; but owing to the north-east winds, which continued over a week, nothing else worth mention turned up.—S. D. BAIRSTOW; Woodland Mount, Huddersfield, May 12, 1878.

ACHERONTIA ATROPUS IN NORTH IRELAND.—A friend of mine has to-day brought me a remarkably fine specimen of *Acherontia Atropos*, which he caught yesterday near the sea—

shore, at rest, on a piece of wood.—T. BRUNTON; Glenarm Castle, Co. Antrim, N. Ireland, May 9, 1878.

ACHERONTIA ATROPOS AND DEIOPEIA PULCHELLA IN DEVON.—I think the following two captures by one individual in one week during this month worthy of record, *viz.*—on May 6th a very good specimen of *Acherontia Atropos* was found; on May 11th was captured an example of *Deiopeia pulchella*, which was slightly worn, but otherwise in a good state of preservation, and now in my possession. Both were taken on the South Devon coast by a gentleman's servant, who, although no entomologist, was struck by their appearance; and he says that the former cried like a child. I may add that in September, 1875, I was fortunate enough to procure seven specimens of *D. pulchella* in this same locality.—ARTHUR H. WALKER; Southgate, Middlesex, May 22, 1878.

ACRONYCTA ALNI.—I have bred two splendid specimens of this rarity from larvæ beaten from oak in Kent, last August.—WM. MACHIN; 22, Argyle Road, Carlton Square, E., May 23, 1878.

DESCRIPTION OF THE LARVA OF NOCTUA DITRAPEZIUM.—On the 19th of May, 1877, I received larvæ of this species from Mr. T. W. Salvage, of Brighton. Length about an inch and a quarter, and tolerably stout in proportion. Head polished; it has the lobes rounded, and is narrower than the 2nd segment. Body cylindrical and of nearly uniform width throughout, only tapering slightly towards the head; segmental divisions distinct, but not deeply notched; skin soft and smooth, having very few, almost imperceptible, short hairs. The ground colour is of various shades of ochreous-brown; in some being almost yellowish, in others of a strong purplish tinge; in all cases on the centre of the dorsal area the ground colour is almost obliterated by a series of large, lozenge-shaped, dark brown blotches, one on each segment; this dark brown colour is also suffused along the sides, a series of still darker oblique marks, one extending upwards and forwards from each spiracle, being very noticeable. Head yellowish brown, with a very dark brown stripe extending from the summit of each lobe to the mandibles. A very fine pale gray line, extending through the lozenge-shaped marks, forms the dorsal stripe; along the subdorsal region is a series of short black stripes, becoming more conspicuous towards the posterior extremity, and forming on the 12th segment two distinct attenuated triangular marks, the apex of each pointed anteriorly, and joined at their bases by a transverse black

stripe, edged outwardly with bright yellow; spiracles conspicuous, oblong, yellowish white. The ventral surface varies according to the colour of the dorsal area, being almost uniformly dull pale ochreous, or purplish, as the case may be. Feeds on birch, and in a state of nature probably also on various low plants.—GEO. T. PORRITT; Highroyd House, Huddersfield, May 16th, 1878.

ANARTA MYRTILLI IN APRIL.—I took on April 18th a fine specimen of *Anarta myrtilli*. Is not this unusually early? Stainton's Manual and other books give it as flying in June or July. It is too fresh and bright to be a hybernated specimen; and it is undoubtedly *A. myrtilli*.—É. CROSS; Appleby Vicarage, Brigg, Lincolnshire, April 28, 1878.

HELIODES ARBUTI NEAR LONDON.—During the present week I have been taking several specimens of *Heliodes arbuti* in a meadow here, within five miles of the metropolis. This is, I believe, a new locality for this pretty species. They seem to keep to one corner of the field, flying about whenever the sun is shining. I may mention that in the field chickweed, on which the caterpillar is said to feed, is particularly abundant here.—N. C. GRAHAM; Silwood, Tulse Hill, London, S.W., May 7, 1878.

XYLOMIGES CONSPICILLARIS.—While strolling along the road from Dartford to Darenth, on the 27th of last month, I found two specimens of this rare species, one on a post, the other on a fence, close to the Gore Farm. I have searched for this insect sixteen or seventeen years, but never saw it alive before. Imagine my surprise at finding two in less than twenty minutes.—E. G. MEEK; 56, Brompton Road, S.W., May 13, 1878.

XYLOMIGES CONSPICILLARIS.—On April 23rd last, whilst collecting in the neighbourhood of Dartford, Kent, I had the good fortune to capture a fine male *Xylomiges conspicillaris*. I found it on a fence, near a large clover field. Mr. H. Packman, of Dartford, captured one on April 27th. This specimen is also in fine condition.—EDWARD R. SHEPPARD; 13, Limes Villas, Lewisham, Kent, May 14, 1878.

THERA VARIATA.—I have just been looking at a pupa of *Thera variata*, and to my surprise found it had all the lines, as seen on the larva, well defined on the pupa. Are there any other pupæ that bear the markings of the larvæ?—G. C. BIGNELL; Clarence Place, Stonehouse, Plymouth, May 18, 1878.

CAPTURES AT EPPING FOREST.—On the Saturday after

Easter Monday I went to the forest in the hope of again taking *Perittia obscuripunctella* and *Chrysocoris festaliella*. but the wind being northerly nothing would move, except two or three wasted *Anticlea derivata*. After working for some time in vain I turned my attention to the thistle-stems, and secured a good supply of the pupæ of *Ephippiphora pflugiana*; and on my way back to Chingsford Station I examined the plants of stitchwort (*Stellaria holostea*), common in the hedges. These produced *Coleophora solitariella* in plenty, nearly full-fed. On a subsequent visit to the forest I met with the following:—*Elachista obscurella*, *Perittia obscuripunctella*, *Grapholita obtusana*, *Stigmonota puncticostana*, *Lobesia reliquana*, and *Dicrorampa plumbana*; *Pyrodes rhediana* were common. The grandest capture was a splendid specimen of *Ephippiphora obscurana*, beaten from hawthorn. I have bred *Gelechia acuminatella* in profusion from larvæ, found in October last, mining the leaves of thistles, on Hackney marshes. Two larvæ found on the same plants, and which hybernated, have now produced *Noctua rubi*.—WM. MACHIN; 22, Argyle Road, Carlton Square, E., May 23, 1878.

ENTOMOLOGY AT THE ROYAL ACADEMY.—It is, we conceive, a thing to rejoice over, when a master of acknowledged standing in the highest walks of art—a learned, thoughtful, austere, and thoroughly academical painter—condescends to execute a designedly and deliberately comic picture. This is what Mr. E. Armitage, R.A., has done in his genial and playfully humorous work—(111) “An Entomological Sale.” The more classical painters who occasionally unbend, the merrier. One of the most irresistibly funny collections of caricatures extant is that engraved by Wenceslaus Hollar, from the pen-and-ink drawings of Lionardo da Vinci. John Leech, Richard Doyle, Hablot Browne, never drew such funny faces as those traced by the immortal painter of the “Cena;” and here we have the grave and dignified Mr. Armitage giving us the humours of an auction of a choice collection of insects, and constructing a genuine comedy which H. J. Byrons might prize and J. L. Tooles adore. Never mind if the old gentlemen who are poring over the “lots” are “beetle-stickers” and “butterfly-butchers.” They are aware of what they are about; they know their Kirby and Spence by heart; they can afford to meet with a cheerful smile the sneers which are occasionally levelled at the pursuit of the science of Entomology; and they hold with the sage that

insects are thoroughly worthy of the deepest study, inasmuch as they are "Nature's favourite productions, in which, to manifest her power and skill, she has combined all that is either beautiful and graceful, interesting and alluring, or curious and singular, in any class of her children." All honour, then, to Mr. Armitage's knot of eccentrics, whose vocation and delight it is to collect specimens of the wonderful little creatures that leap, that run, that fly, that walk, that bore into the ground, that drive galleries through timber, that disport themselves in the air or gambol in the water, that gleam with phosphorescent radiance, that furnish us with silk, honey, wax, and lac, that build structures more marvellous than the pyramids, and that can upon occasion defend themselves stoutly, and, with poisoned weapons, resent the outrages of the tyrant Man. What is he, after all, with his two eyes and two legs, when yonder tiny thing, crawling on the rim of a wine-glass, has eyes by octaves and legs by the dozen? Mr. Armitage's whole picture, with its quaint motto, "Beati Possidentes," is replete with qualities of quaintness and sober drollery; and the entomological specimens on the auction room table, with the other details, down to the matches "warranted only to light on the box," are most dexterously and effectively rendered.—'Daily Telegraph,' May 18, 1878.

ANSWERS TO CORRESPONDENTS.

SPHINX LIGUSTRI.—Does the larva of *Sphinx ligustri* change its skin only once? I see by 'Larvæ of the British Lepidoptera, and their Food-plants' (part 1, p. xxiv of the Introduction), by Owen S. Wilson:—"Some lepidopterous larvæ change their skins many times, others but few, *Sphinx ligustri* but once;" and by the plates some of the *Sphingidæ* have the horn on the 12th, but most of them have it on the 13th segment, and many of them have fourteen segments. Is this correct? I was taught by an old entomologist that all larvæ had thirteen segments, the head always considered the 1st.—W. COSDY; Laira, May 18, 1878.

[Newport, quoted by Packard, 'Guide to the Study of Insects' (p. 63), states that the larva of *Sphinx ligustri* moults six times. The body of the larvæ of Lepidoptera consists of thirteen segments, counting the head as one; never, I believe, of fourteen. In the larvæ of the *Sphingidæ* the horn, when present, is on the 12th segment.—ED.]

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DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR'S 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 136.)

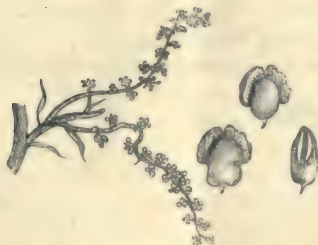


Fig. 87.—Galls of *Andricus Schlechtendali* of the natural size on the catkin, and magnified.

87. *Neuroterus Schlechtendali*, Mayr (*Andricus burgundus*, Schlechtendal).—This very small gall is to be found in May, during the blooming time of the oak, on the catkins of *Quercus sessiliflora*, *Q. pedunculata*, and *Q. pubescens*. It consists of a greenish yellow swelling of the stamen and connective, in such a manner that the divisions of the bloom become more crowded below, less above, or not separated. The stamen mostly attains to a diameter of 1 millimetre, or somewhat over; the chamber is, in the mature gall, surrounded by a moderately hard shell, as an inner gall, on which the succulent part of the gall lies after withering. After the general fall of the catkins, when their stalks become quite withered, some generally remain on the tree: it is on these that many examples of this gall, which are still green, are to be found; and it is about this time that the galls themselves fall to the earth, so that if we now shake a tree

bearing these galls they fall in immense quantities. On May 22nd and 25th of this year (1871) I found the galls in great numbers near Vienna, mostly on *Q. pubescens*. Several times I found the galls of *N. Schlechtendali* and *Andricus amenti* together, on the same catkin. Herr v. Schlechtendal found the galls on May 7th, 1869. He kept them on wet sand, and obtained the small gallflies on July 28th of the following year.—G. L. MAYR.

This inconspicuous little catkin gall has not been recorded as British. Probably it occurs here, but has been overlooked.—E. A. FITCH.



Fig. 88.—Galls of ? *Cynips seminationis*. Fig. 88A. Of ? *C. inflorescentiae*.

88. ? *Cynips seminationis*, Gir. (? *Cynips inflorescentiae*, Schlechtendal).—This gall, which, according to Dr. Giraud, is to be found on *Quercus pedunculata*, and bears a great resemblance to the gall of *Aphilothrix callidoma*, occurs on a catkin with a thickened stalk. It is of about the size of a barley-corn, or slightly smaller, spindle-shaped, pedunculated or sessile, and covered with few or many more or less sharply defined, often quite indistinct, longitudinal ribs. The green, later brown, often (as *C. inflorescentiae*) bearing red longitudinal striations, gall is covered with deflected, light, short, scattered hairs, and bears a papilla at the apex; at the base it is encircled with a dense wreath of hairs. According to Dr. Giraud the gall falls in the latter half of May. The gall fly is quite unknown.—G. L. MAYR.

From Dr. Giraud's description this appears to be a form of the rather variable gall of *Aphilothrix callidoma*, Hart. (Entom. viii, 290), but can be referred to no species with

certainly, as the *Cynips* has not been bred. According to Dr. Mayr a female of *Synergus albipes*, Hart., and *S. facialis*, Hart., have been bred from these galls at the end of July of the same year.—E. A. FITCH.

COLLECTED OBSERVATIONS ON BRITISH SAWFLIES.

By the late EDWARD NEWMAN.

(Continued from p. 91.)

PROCEED we now to distribute the Hymenoptera, to which the sawflies undoubtedly belong. The grand divisions are four, as usual; and these are dependent on food and economy. There are various classifications of this interesting group, all more or less dependent on that character; so that the task of distribution is comparatively easy. However different our systems may appear on paper, there is evinced a concurrent disposition to employ these as the leading principles; and Nature, the great mistress and teacher in the matter, appears to have marked them with unmistakable clearness.

1. *Pædotropha*, in which the eggs are generally laid in cells prepared for their reception. When the larva emerges it is fed by the parents; mouthful after mouthful is brought as required, and placed in the mouth of the young one, which is helpless as an infant. All these have three sexes.

2. *Creophaga*, which store up insects of all kinds, also spiders, for the food of their young. It is said that these poor creatures receive a sting from the parent at the time of incarceration, and that this deprives them of all muscular power. Although these poor prisoners remain dormant, yet they are not absolutely dead; at least the prey remains perfectly fresh until required for the food of the larvæ.

3. *Biophaga*, which, in the larva state, live entirely on the living fluids of other insects, feeding until the skin, or exoskeleton, remains a shrivelled and empty sack; it then sometimes emerges to undergo its transformation to a pupa; but this change more frequently takes place inside of the skin. This may be truly said to be feeding on life.

4. *Phytophaga*, which eat nothing but plants, generally the tissue only of the leaves, but sometimes also the pith and solid wood.

These, however, require a rather more detailed description.

1. The *Pædotropha*, or children-nurses. Sociality is the general attribute of this group—bees, wasps, and ants. The young are invariably apod. The food supplied by the parents is principally the honey of flowers, and the honey-dew secreted, or supposed to be secreted, by plant-lice. St. Fargeau informs us that the young of wasps are fed with particles of more solid food, and that whenever the feeder appears they open and shut their mouths, like young birds gaping for a grub when brought by their parents. This is by no means the case concerning the bee, for, though fed, the feeder and the fed generally exhibit great affection for one another, though perhaps a kind of cupboard-love. The colony consists of three kinds of individuals—male, female, and neuter. The neuters do the work of the colony: build the hive, feed the young, and make themselves generally useful. It may be stated that they sometimes take the management of the community into their own hands; for DeGeer tells us of the ants, that they have been seen to kill and devour the babies: this may arise from the difficulty of procuring food for them. This same operation takes place also with the hive-bee in the destruction of the drone. The females and neuters are provided with stings, which seem for this purpose only; at least they are very inefficacious as weapons of either defence or offence. Three natural orders comprising this family build those remarkable cells which have excited the wonder and admiration of all; and these architectural powers are abundant sources of speculation. Imaginative and florid writers have invested the subject with an interest that makes it so; for the same phenomena take place in hexagonal crystals, in basaltic columns, in the facets of an insect's eye, and in a hundred different circumstances, in which the will or instinct, or contrivance or foresight, of the substance cannot possibly have been brought into play. It is desirable that writers on Natural History should direct their flow of glowing sentences to the wonders thickly scattered around them, and which are unmistakable, rather than create wonders out of the most commonplace occurrences which can possibly attract the notice of the uninitiated. The fact of a chicken being hatched by the simple process of incubation is far more wonderful than that ordinary caterpillars should be arrayed as moths. The latter fact is always noticed as remarkable, while the former invariably remains unnoticed. In this order the hexagonal cell is of frequent recurrence; but we must not lay too much

stress on these hexagons, as exhibiting instinct in the fabricator, though no doubt the instinct is clearly displayed, as in all insect operations, but we certainly are aware that the cells have to be constructed as closely approximate as possible, not only to economise space and material, but also because each cell is thus compelled to give six others the greatest amount of support; thus strength, economy of material, and economy of space and time are attained in the highest degree. The more salient groups of the *Pædotropha* are the *Apidæ*, *Andrenidæ*, *Vespidæ*, and *Formicidæ*. They are the most prominent at present for their habits and economy.

2. The *Creophaga*, which store up insects of all kinds as food for their young. They differ from the *Pædotropha* in abandoning their progeny, being satisfied that they will find out and appropriate the food provided for them. The food consists of spiders, grasshoppers, cockroaches, flies of all kinds, caterpillars, and occasionally the imagos of Lepidoptera. These creatures appear to be still living with the parent *Creophagan*, but to have been stung, and thus rendered numb and helpless. The stings of this order seem to possess the power of reducing the victim to a semi-torpid state, in which we may hope they remain without sensation; for from this time forward they have neither food, light, nor liberty, but remain in a perfectly helpless state, until required for the food of the *Creophagan*.

3. The *Biophaga*, or those which, in the larva state, are imprisoned in the bodies of living insects, on whose flesh they feed during the whole of their larval existence, until their victim is shrivelled and reduced to a mere skin, and yet retains a languid animation. The *Biophagan* may be supposed instinctively to avoid the vital parts of its prey, since, by destroying life, it would induce its own death; it is essential to the well-being of the *Biophagan* that its prey should retain life as long as its own life and appetite endured. It generally leaves its victim before life is entirely extinct, and, spinning its cocoon on the exterior, in due time undergoes its final change to lay its egg on another victim, and thus inaugurate another cycle of cruelty and rapine.

It is impossible to meditate on these details and not to rejoice in the belief that the victims of this treatment are not, like ourselves, sensitive to pain; indeed, there are many circumstances connected with the inquiry that lead to this conclusion: it would be horrible to suppose that millions

upon millions of beings were annually born to feed parasites that are ever feeding on their living flesh.

From the observations in Kirby and Spence it will be seen that those far-seeing naturalists viewed this matter in an entirely different light; they simply regarded the phenomena from a utilitarian point of view. I will quote the passage entire, since it illustrates my theme, although I can by no means concur in the moral drawn from the facts. "From the observations hitherto made by entomologists the great body of the ichneumon tribe is principally employed in keeping within their proper limits the infinite host of lepidopterous larvæ, destroying, however, many insects of other orders; and perhaps if the larvæ of these last fell equally under our observation with those of the former we might discover that few exist uninfested by their appropriate parasite. Such is the activity and address of the Ichneumonidans, and their minute allies the *Pupivora*, that scarcely any concealment, excepting perhaps the water, can secure their prey from them, and neither bulk, courage, nor ferocity, avail to terrify them from effecting their purpose. They attack the ruthless spider in his toils; they discover the retreat of the little bee that for safety bores deep into timber; and though its enemy Ichneumon cannot enter its cell, by means of her long ovipositor she reaches the helpless grub which its parent vainly thought secured from every foe, and deposits in it an egg, which produces a larva that destroys it. In vain does the destructive *Cecidomyia* of the wheat conceal its larvæ within the glumes that so closely cover the grain: three species of these minute benefactors, sent in mercy by Heaven, know how to introduce their eggs into them, thus preventing the mischief which they would otherwise occasion, and saving mankind from the horrors of famine. In vain also the *Cynips*, by its magic touch, produces the curious excrescences on various trees and plants, called galls, for the nutriment and defence of its progeny. The parasite species attached to it discovers its secret chamber, pierces its wall, however thick, and commits the destroying egg to its offspring. Even the clover-weevil is not secure within the legumen of that plant, nor the wireworm in the earth, from their ichneumonidan foes. Others are not more secured by the repulsive nature of the substance they inhabit; for two species at least of Ichneumon know how to oviposit in stercoraneous larvæ without soiling their wings or bodies."—*Introduction to Entomology*, i. 267.

I have named the group *Biophaga*, or life-eaters, because I thought that name more truthful, descriptive, and emphatic, than those hitherto employed,—*Entomophaga*, *Isophaga*, *Parasita*, *Ennivora*, *Pupivora*, *Pupophaga*, &c. The *Evaniidæ*, *Ichneumonidæ*, *Chalcididæ*, and *Proctotrupidæ*, are generally esteemed the principal families of this order. This is a much more extensive group than is generally supposed. We are too apt to regard Ichneumons as a large tribe of insects associated from their propensity to live parasitically on the caterpillars of butterflies and moths; but this scarcely gives a sufficiently comprehensive idea of the phenomena. Prof. Westwood, in that vast repertory of entomological facts,—which requires an index,—‘Introduction to the Modern Classification of Insects,’ has collected from a variety of authentic sources a vast amount of information which widely extends our views of these Biophagans, and shows that scarcely an insect is secure from their attack. I will enumerate a few of these instances.

Octopoda.—Several spiders are subject to this plague: the beautifully silk-like egg-nests of many spiders are attacked in this way, and the eggs thus prevented from coming to maturity. Indeed one species of Biophagan is so well known for its ravages on the spider-world that it has received the name of *Ichneumon aranearum*.*

Hexapoda.—In Lepidoptera the liability to parasites is the rule, its absence the exception. In Diptera I have observed the frequent occurrence of hyperparasitism, that is when the fly has deposited its egg on or in the larva of a Lepidopteron: the larva proceeding from that egg has become the prey of a Biophagan, and thus the original life has been forfeited; the life of the dipterous destroyer has also been forfeited; and the destroyer of the destroyer, or the hyperparasite, has been the only life to escape. As an example I may state the common woolly-bear, the larva of *Chelonia cava*, feeds a host of these Biophagans, not only direct parasites, or parasites which not only fulfil their murderous mission on the woolly-bear itself, but which nourished with their own living flesh hundreds of minute Biophagans; so that the bear and its parasites alike perish under the terrible infliction of these almost invisible murderers. Some even go farther than this: they pierce the eggs of Lepidoptera with their ovipositor, and fill these eggs with their ravenous progeny. In a word, this parasitism is so

* *Ichneumon aranearum*, Fourc., is *Pezomachus zonatus*, Först.

common among butterflies and moths that I know not a single species that escapes it altogether. *Papilio Machaon* perhaps offers the nearest approach to immunity, for I have never bred more than two parasites from this noble butterfly. The Hymenoptera themselves are subject to the attacks of numerous parasites. There is one group whose parasites are of another class: these are the *Pædotropha*, or those which live in vast communities. These are preyed upon exclusively, as I believe, by Coleoptera, the genus *Rhipiphorus* and *Zenos* attacking the *Vespidae*; *Horia*, *Sitaris*, *Melœ*, *Stylops*, *Kleucus*, *Hylecthrus*, and *Halictophagus*, being parasitic on solitary species. These I have elsewhere described as having a metamorphic larva: the first stage very slender, hexapod, and active; the second, obese, apod, and stationary. Most of the phytophagous Hymenoptera are subject to this plague: the common leathery cocoon of *Tenthredo cratægi*, often seen in abundance in our whitethorn hedges, is frequently stuffed to bursting with the larvæ of a Biophagan. In Coleoptera the instances of the parasitism of these Biophagans are by no means so numerous. *Timarcha tenebricosa* is subject to this plague, but never to any great extent. *Coccinella 7-punctata* has a similar enemy, and numerous *Rhynchophora* suffer from their attacks: the genera *Barynotus*, *Otiorynchus*, and above all the quaint *Apions*, particularly *A. apricans*, the insect which I described elsewhere as so destructive to clover-seed. If you sweep the clover with a bag-net the proceeds will contain the *Apion* and a small *Pteromalus* in about equal numbers: and as for *Otiorynchus sulcatus*, that inveterate enemy of green-house ferns; *O. notatus*, which infests the larch; and *O. scabrosus*, that plague of the rose grower—they are all subject to Biophagan assaults. So also are the various species of *Ptinidae*; and these life-destroying creatures not only traverse our posts and rails, and fences and timber, out of doors, but enter our houses with the charitable intention of finding and destroying these boring creatures, while thinking themselves safe in their cylindrical galleries. The larvæ of *Mordella* and *Orchesia*—*Orchesia micans*—fall a prey to these parasites. On the Orthoptera the Biophagans make but little impression. The locusts which have devastated the Western States of America are infested by a Biophagan, but in such small numbers that it fails to make any impression on the multitudinous hosts of these destroyers. In Neuroptera a singular instance is given by Mr. Kirby

of a minute *Biophagan* being found on *Æschna viatica*; and Boudier has discovered one that attacks the ant-lion in his pitfall. This appears the most extraordinary instance of all. The ant-lion constructs its pitfall for the sole purpose of entrapping wandering and unwary flies that may chance to venture too near the brink of the treacherous precipice prepared for their destruction: and here we see a powerless insect boldly bearding the lion in his den; and by the insidious process of puncturing and depositing an egg that will hatch within his body and produce a grub that will, by slow degrees, consume his living flesh, avenging a whole legion of flies which have fallen victims to his rapacity. This is the most remarkable instance of all; and here I will draw the curtain over the harrowing scene.

Still another feature must be added to this sad story, that of eggs and egg-setting. Many of these *Biophaga* are so minute that they are born and pass through the state of egg, caterpillar, chrysalis, and imago, within the egg of a butterfly or moth. I have been told that hundreds of these minute creatures have been seen to issue from a single egg. Perhaps it was in reference to these wonders that Cowper wrote:—

“The shapely limb and lubricated joint
Within the small dimensions of a point,
Muscle and nerve miraculously spun
His mighty work, who speaks and it is done.”

4. The *Phytophaga*, which in the larval state feed entirely on plants. The families are *Tenthredinidæ*, *Xyelidæ*, *Siricidæ*, and *Cynipidæ*. Since it is compulsory that I should enter more fully into the details of this order in a future portion of this paper, I will not introduce them here. It is quite certain that as our philosophical knowledge of the *Hymenoptera* progresses, many, perhaps all, of the groups which I have called families will take the rank of natural orders.

Although the characters by which this plant-eating tribe seem so trenchant as to admit of neither difficulty nor confusion, yet we shall see that it is so comprehensive as to require subdivision within its own compass. Thus some may be denominated *Phyllophaga*, or leaf-eaters, from their larvæ eating the leaves only; others, *Myelophaga*, from a similar preference for the pith; a third order, *Xylophaga*, devour the solid wood; and a fourth have the singular economy of setting up a diseased action locally in the plant, and eat nothing but the abnormal productions which their attack has occasioned,—these are the *Nosophaga*, or *Cynipites*. To the

last of these belong the sawflies, a group of insects that seem isolated in a very remarkable manner, so much so indeed that our more philosophic and systematic entomologists exclude them from the Hymenoptera altogether. In the larva state they resemble Lepidoptera, in the pupa state they assimilate to Coleoptera, and the perfect insect is a complete Hymenopteron, possessed of most of the distinctive characters in a very marked degree, the wings being also extended.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. IX. NYMPHALIDÆ—HELICONINÆ.

IN structure the butterflies of this subfamily resemble the *Acraïnæ*, and their larvæ are also spiny, but the palpi of the imago are clothed with fine scales, and hairy in front. Their closed wing-cells will prevent their being confounded with the typical *Nymphalinæ*, and their very long rounded wings separate them at a glance from nearly all other butterflies, except the *Danainæ*, which some of them mimic, but from which the simple submedian nervure of the fore wings will distinguish them. The subfamily, as at present constituted, includes but two genera, *Heliconius* and *Eueides*, the former of which may be known by its longer and slenderer antennæ, with a much more gradually formed club. All the species are tropical American.

The first section of *Heliconius* comprises black and fulvous species, spotted or banded with yellow, and frequently resembling *Tithorea*, *Lycorea*, *Melinæa*, &c., in markings. Some of these, such as *H. Eucrate*, have a conspicuous white spot in the broadly black tip of the fore wings. Another section is black, or bluish black, variously banded with white or yellow. Thus *H. Antiochus* has two narrow white bands on the fore wings; *H. Diotrepes* a very broad one; *H. Cydno* a broad yellow one on the fore wings, and a submarginal white band on the hind wings; and *H. Rhea*, and allies, a broad yellow band on the fore wings, and a narrower one towards the tip.

H. Charithonia, the commonest species in the West Indies, has two narrow yellow bands across the tip of the fore wings, and another running from the base, and curving

at about half its length towards the hinder angle, to which it nearly extends. There is a basal stripe on the hind wings, and an outer continuous row of spots. In *H. Atthis* the hind wings are similarly marked, but the outer spots are milk-white, and there is a short yellow basal stripe, with a broader transverse one at the extremity, beyond which are one or two white spots, and an outer row corresponding to that on the fore wings. I know of no genus which presents a greater variety, combined with so much uniformity, of both colour, marking, and pattern, as *Heliconius*.

One of the prettiest species is *H. Cyrbia*, which is dark blue, with a red transverse band on the fore wings, and the border of the hind wings spotted with white. A great number of the commonest and best-known species are black, red, and yellow. *H. Clysonymus* has an irregular transverse yellow band on the fore wings, and a broad red band on the hind wings. In *H. Phyllis*, and its allies, these colours are reversed, there being a red band on the fore wings and a yellow one on the hind wings, and sometimes a yellow basal streak on the fore wings also. *H. Erate* is remarkable for appearing under two forms in both sexes, which were naturally supposed to be two species, till Mr. Bates reared them both from the same larva. In both there is a large transverse cluster of yellow spots in the middle of the fore wings, and a band of four or five large spots across the tip; but in typical *Erate* the hind wings are rayed with red; and in *Doris* with greenish blue. Some forms, allied to *Melpomene*, in which there is a large red stripe across the fore wings, are marked with red only, being more or less banded, spotted, or rayed, on the fore or hind wings, or both; and *H. Thelxiope* is rayed with red on all the wings, but more or less spotted with yellow beyond the middle of the fore wings. *H. Ricini*, a species somewhat approaching *Eueides*, has a yellow band on the middle of the fore wings, and a smaller one towards the tip; the hind wings are red, with a broad black border.

The species of *Heliconius* measure from two to four inches in expanse; but those of *Eueides*, which, as we have said, may be known by the difference in their antennæ, rarely exceed two inches and a half. They are generally black and tawny, varied with dull yellow. The first group resembles *Heliconius Thelxiope* and allies, being black, veined with dull red, and spotted with dull yellow beyond, instead of sulphur-yellow. *E. Thales* may be considered as the representative of this group. Another group, of which *E. Lybia*

may be considered typical, is fulvous, with the borders broadly black, and a broad black band towards the tip of the fore wings. In *E. Olympia* the tip is broadly black, with a large white spot. In the last group, comprising *E. Cleobea*, &c., which sometimes measures three inches across the wings, the species are banded and spotted with black and tawny, and with ochre-yellow beyond the middle of the fore wings, nearly as in *Lycorea* or *Melinea*.

Fritz Müller has lately proposed to introduce the genera *Colænis* and *Dione* into the *Heliconinæ*, considering that their resemblance to *Heliconius* and *Eueides* is so great, both in structure, habits, and transformations, that the difference in the wing-cells ought not to be considered; but I do not wish to disturb the usual arrangement in the present series of papers.

(The present paper has been accidentally transposed; it should have preceded the first paper on *Nymphalinae*.)

ICHNEUMONS.*

By EDWARD A. FITCH.

"THE most formidable difficulty in the way of the investigation of some of what I have called the 'neglected orders,' is the want of accessible handbooks." So says Dr. Parsons in a paper, on the general study of Natural History, read before the Selby Naturalist's Society (see the 'Naturalist,' December, 1877, and January, 1878). This paper contains many worthy hints, which deserve to be borne in mind and acted upon by entomologists especially, and sets forth many important truths. The study of the terebrant Hymenoptera has been greatly retarded in Britain by the want of accessible handbooks. However we have one now in course of publication which will certainly be a great help to the student of the entomophagous section of this interesting class of insects. The author has also been the elucidator of the life-histories of the phytophagous sawflies, many of which have been translated into the pages of the 'Zoologist' and 'Entomologist.'

Of the neglected Ichneumonidæ we have, thanks to Mr. Marshall, an excellent catalogue; but I believe there is by

* 'Flies-graphia.' Illustrations of more than 1000 species of North-west European Ichneumonidæ sensu Linnaeus. Parts 1-6, quarto. Martin Siebold, The Hague, 1875 et seq.

no means a representative private collection in Britain. Mr. Desvignes's is now located in the British Museum, which also contains the general collection of Dr. Reuter. Mr. F. Walker's was the hard work of a life-time, but unfortunately would have required another life's work to have made it of use; the number of specimens was large, and many interesting, but it lacked all system or arrangement.

There are but few entomologists who do not know these insects, many certainly with dislike; but the few who have wished for a better knowledge of the families, and the truly wonderful economy of the species, have been deterred for the want of an instructor. This is to be deplored, as from their parasitism many species will necessarily remain extremely local, though perhaps not rare, and the economy of others, for lack of the determination of the species, remains unrecorded. Some years ago the fine *Arotes albicinctus* was considered a very rare insect. When the indefatigable Mr. F. Smith was at Mr. Stephens's, on one of his memorable Wednesday evenings, conversation turned on this insect. Mr. Stephens described the very oak tree, in a lane near Darenth Wood, on which he had captured the species. Mr. Smith journeyed to "Darn," sought out the described tree, and there on its trunk was *Arotes* waiting for him. A fine instance of the value of locality. Till use is made of the opportunities which continually offer for the classification of these facts, the progress in the study must be small. Few are preserved, and these seldom to a good purpose. The whole proceedings with these parasites, continually being bred from insects of all orders, show nothing but neglect: that this has been the case is particularly observable. Since my remarks last December I have received three small parcels of Ichneumons, and curiously enough each has contained a species new at least to Britain: this shows how much is to be done. With bred specimens a knowledge of the economy of both the preyer and the preyed upon cannot fail to lead to important results: this has also been greatly neglected. Mr. F. Bond, during his long experience, acquired a considerable collection of the lepidopterous parasites, each specimen being labelled with information as to its parasitism. These he gave to the late Mr. Desvignes, who, although a very talented entomologist, was unfortunately a systematist; and on acquiring this interesting collection his first action was to remove the disfiguring labels, and so destroy its essential value.

Another fact militating against the scientific study of the Ichneumonidæ and allied families has been the involved synonymy, this owing to the writings of the various authors being so scattered that many were unknown the one to the other; further than this the same insect is repeatedly described under different names, and different insects under the same name,—this even by the same author. The difficulties created by this latter fact made the following of Walker in the *Chalcididæ* seem to me almost a hopeless task. Vollenhoven's beautiful figures will serve as a starting point to remedy much of this. An instance:—I happened to take Part VI. to the British Museum; on looking through it Mr. F. Smith at once detected an apparent error. Plate 30 beautifully illustrates the three first genera of the *Chalcididæ*; fig. 1 was named *Smicra sispes*, L. Here was the confusion: the species with yellow femora was discovered by the late Mr. F. Walker to be parasitic on the curious larva of the *Stratiomydæ*, from which it was also bred by Mr. Smith, and was generally known as *S. sispes*. To prove this the National Collection was examined; this quite corroborated Mr. Smith's opinion. Van Vollenhoven's species was the one with red femora. To prove him wrong Fabricius was referred to, and there we find—"C. nigra abdominis petiolo femoribusque posticis incrassatis *flavis*;" but to make doubly sure we went back to Linné, and there sure enough was "*rufis*." Thus, through Fabricius's careless copying, error was perpetuated, at least in Britain.

The fourteen plates of the 'Schetsen,' published some ten years ago, were a valuable aid to the study of the Hymenoptera: what Meigen did for the Diptera, Van Vollenhoven wished to do for the Hymenoptera. 'Pinacographia' is a continuation of this venture on a larger and more elaborate scale: the work is published at the Hague in parts, which appear at irregular intervals; six have already appeared. Each part contains eight pages of letterpress and five coloured plates; the price is 3.50 fl. (about seven shillings English) per part. The text is printed in parallel columns in Dutch and English, which is intelligible, if not good: this part of the work is undoubtedly poor and superficial as far as it at present goes, but better things are promised. "Of course the text is a matter of secondary importance, and will only contain the explanation of the plates, diagnoses and short descriptions of new species, with analytical tables, and some remarks on Biology. Meanwhile it may be possible that the drawing of

such a number of figures will procure me so much knowledge of the relationship of the different genera that I may be induced at the end of this work to give a general systematical review of the families examined." This is from the Introduction; and if the tables of species and tables of parasitism, which are promised, be given it may be made a complete work. Much of Ratzeburg's information needs revision. Too much cannot be said in praise of the extreme excellence and beauty of the plates: they are so absolutely correct both in colour, delineation of the structural details and general excellence of production, that it must be almost impossible to fail to recognise the species at once. They are all drawn by Snellen van Vollenhoven himself, and most carefully engraved by A. J. Wendel. With these figures at hand it can be by no means difficult to work out to a fuller understanding of the genera the descriptive works of Gravenhorst, Förster, and Thomson, or the scattered papers of our own Haliday and Walker in the smaller species. 'Pinacographia' treats of the *Ichneumonidæ* in the Linnean sense, and so includes most of the parasitic Hymenoptera, viz., the *Ichneumonidæ*, the *Braconidæ*, the *Proctotrupidæ* (*Oxyura*), and the *Chalcididæ*. A synopsis of the various genera has already been translated into English;* and it is to be hoped the appearance of the work now under notice, if carried to completion, will materially help to the filling in of this large framework. Although printed in English I believe there are something less than half a score copies of this beautiful work find their way into Britain; this I can but think is because it is not better known. For an acquaintance with Ichneumons generally there is certainly nothing to equal it.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES FROM GUERNSEY.—Through illness and other causes I have been prevented from doing much in Entomology during the past two years. I am, however, pleased to record two additions to my list of Macro-Lepidoptera

* "Translation of Synoptical Arrangements of some European families and genera of Hymenoptera," by Francis Walker: London, E. W. Janson, 1874; price 1s. "Notes on Chalcididæ," by Francis Walker: London, E. W. Janson, 1871, 1872; Parts I.—VII.; price 6d. each. "Notes on the Mymaridæ," by Francis Walker: the 'Entomologist,' October, 1873; price 1s. "Notes on the Oxyura," by Francis Walker: the 'Entomologist,' November, 1873; January, 1874; February, 1874; price 6d. each.

inhabiting these islands, viz.—a specimen of *Ephyra punctata*, captured by a lady in her garden, St. Peter-Port, Guernsey; and one *Xanthia silago*, taken at sugar, by the Rev. G. H. Engleheart, in Sark, during September, 1874, and accidentally omitted from my list. Last year I had a splendid specimen of *Argynnis Lathonia* brought to me. From its condition it had evidently just emerged from the chrysalis. A larva found feeding in the seed-head of an Indian pink turned out to be the common *Dianthæcia capsicola*. *Colias Edusa* was very abundant last year all over the islands: in clover and lucerne fields they actually swarmed; and were as common in gardens as the *Pieridæ* in ordinary seasons.—W. A. LUFF; Guernsey.

ACHERONTIA ATROPOS IN THE COUNTY CORK.—A specimen of this moth made its appearance, and was captured at Schull, on the evening of June 8th, at 9.30. It flew into the drawing-room of the house in which it was taken, and attracted attention by the heavy flapping of its wings against the windows. It “cried” frequently while it was being caught, and afterwards.—W. W. FLEMYNG; The Vicarage, Glengariff, co. Cork, June 17, 1878.

FOOD OF ACHERONTIA ATROPOS.—On August 6th, 1877, I found a larva of *Acherontia Atropos* feeding upon the spindle tree (*Euonymus Europæus*). Is not this of rare occurrence? —FRED. ENOCK; 30, Russell Road, N.

CHÆROCAMPA CELERIO AT ALDERLEY EDGE.—While standing near an azalea tree in full bloom, on May 24th last, I captured a specimen of *Chærocampa celerio*. It is a little rubbed upon its thorax, but is otherwise in good condition.—WM. W. KEYWORTH; Alderley Edge, near Manchester, May 25, 1878.

STAUROPOUS FAGI.—On the evening of June 5th I had the pleasure of taking a fine male example of this somewhat scarce insect, on the trunk of a fir tree, in Knowle Park, Sevenoaks. It was in beautiful condition, and had apparently never flown.—C. J. BIGGS; South Hackney, June 18, 1878.

ACRONYOTA ALNI BRED.—The larva of *Acronycta alni*, recorded in the ‘Entomologist’ by me in 1877, produced a perfect specimen on the 27th May this year.—T. H. TAYLOR; George Street, Wakefield.

A TORTRIX NEW TO BRITAIN (PENTHINA POSTREMANA).—Last autumn, having nothing else to do, I was sitting on an old stump looking at the peculiar jointed stems of the balsam (*Impatiens noli-me-tangere*); I fortunately split one open,

and found a larva, of a dirty whitish colour and a dark black head, ensconced snugly inside. Seeing it was a Tortrix larva, and in such a rare plant, I spent three days hunting them. The result has been, on May 4th last, I bred two specimens of the very handsome *Penthina postremana*. Since then I have bred three more specimens. I sent one to Mr. C. G. Barrett for examination, and he has identified it for me. Prior to that Mr. Stainton had written me there were only two Tortrices known to feed in the stems of the balsam on the Continent, viz., *Penthina fuligana* and *P. postremana*. Luckily it is the new one, although the former is still a rare species.—J. B. HODGKINSON; 15, Spring Bank, Preston, May 26, 1878.

 REVIEW.

*The Transactions of the Entomological Society of London
for the year 1877.*

THE volume for 1877, although not quite so bulky as its predecessor, certainly cannot be said to be far below it in interest, more especially to the student of British or applied Entomology apart from the descriptive, though much of this interest will perhaps centre in the Proceedings. In the number of memoirs which it contains it exceeds the volumes for both 1875 and 1876, and is the same as that for 1874. Of the twenty-eight separate papers fifteen are purely descriptive, and four are revisions or monographs of certain special families. Of the remaining nine, five are of more or less general interest, and four only can be said to come within the range of the observing and general entomologist; still, as the custom is, this must be looked upon as a fair average.

For four, out of the above-mentioned five, memoirs our thanks are due to the President, Prof. Westwood. They are entitled:—"Notes upon a Strepsipterous Insect parasitic on an Exotic species of Homoptera;" "Notes on the genus *Prosopistoma* of Latreille;" "Entomological Notes;" and "On the adult Larvæ of the *Stylopidae* and their Puparia," which is by Sir Sidney Saunders, with further remarks and figures by the Professor. These observations are supplementary to the first paper on the Stylopoid parasite of the Borneon Homopteron. The fifth of these memoirs is a "Note on *Mygale stridulans*," by Prof. James Wood-Mason, which contains a graphic and detailed description, from the pen of Mr. Peal, of the way in which this spider ~~stridulates~~ stridulates; it is

also accompanied by a capital plate. Prof. Westwood's "Entomological Notes" are (1) on the pupa of a trichopterous insect (*Anabolia nervosa*), which swam about in water like a *Notonecta*, with some remarks on its structure and habits; (2) on the parasitism of certain lepidopterous insects, which contains observations on a lepidopterous larva captured in South India clinging to the abdomen of an Homopteron; Prof. Westwood thought it an instance of true parasitism, but Mr. Wood-Mason, the original owner of the specimens, inclined to the opinion that the larva was the messmate, rather than the parasite, of the Homopteron; (3) on the lepidopterous genera *Himantopterus*, Wesmael, and *Thymara*, E. Doubleday. The former of these (the unique specimen of which is in the Brussels Museum) was transferred by Dr. Hagen to the Neuroptera; it is here relegated to the Lepidoptera, as an ally of *Thymara*, in which class it was originally described by Wesmael.

The four memoirs which may be looked upon as of more general, if of less scientific, interest, are Mr. Distant's paper on "The Geographical Distribution of *Danaïs Archippus*;" Mr. J. W. Slater's two papers on "The Food of Gaily-coloured Caterpillars," and his "Vivarium Notes on some common Coleoptera;" together with another of Mr. Mansel Weale's highly interesting papers on "The variation of *Rhopaloceros* forms in South Africa." This latter paper is thus summarised in the Proceedings:—

"The author, after stating that he had travelled over most of the eastern districts of the Cape Colony, alluded to the distribution of plants as affecting that of insects, and noticed the apparent encroachments of the subtropical flora and insect fauna along the south-eastern seaboard, the absence of any great barriers, and the general uniformity tending to produce close variations. He exhibited and remarked on a large series of *Papilio merope*, male and female, some reared by him, and all collected in one small wooded gully, isolated in an open grass country. He also exhibited male and female *Nymphales ziphares* (*Thyestes*), the male of which is wanting in the National Collection, remarking on the apparent imitation by the female of *Amauris echeria*. He next exhibited and remarked on a series of imagines of *Acrœa cœstria*, some of the forms of which are separated by some entomologists, and stated that all the forms had been reared from larvae collected on a single plant. He next exhibited a series of *Junonia pelargis* and *J. archesia*, showing a very close gradation linking the two forms, and showed that some of the latter approached *J. amestria*, although the alliance was not so evident as in *J. pelargis*. He objected to the use of the name "species" as too freely used among plants and insects, and suggested that it merely implied a

provisionally uncertain distinction of apparently important differences. In illustration of this he exhibited specimens of *Callosune evarne* and *C. keiskamma*, two forms hitherto held distinct, but of which the ova, larvæ, and pupæ exhibited no differences, although in two broods in successive years the forms appeared separately. He also remarked on artificially produced changes in the pupæ."—P. xiv.

Mr. Slater's first paper contains some interesting facts upon the food and protection of certain lepidopterous larvæ, presumably with a view to prove that there is a connection between "conspicuous coloration and a poisonous or offensive food-plant." His notes on Coleoptera refer to the habits of several well-known species, many interesting facts being spoken to from direct observation: an important one is that the *Telephori*, from their pugnacity, so well known as "soldiers" and "sailors," are diligent devourers of *Aphides*; and Mr. Slater goes so far as to say that "In this respect I should think that they are more serviceable to the farmer and gardener than the ladybirds, being more voracious, more active, and, on the average, more numerous."

Mr. Distant's memoir is a rather elaborate paper on "The means of Dispersal and Conditions which are favourable to the Survival in a New Habitat," of Lepidoptera in general, with especial reference to *D. Archippus* in particular. Three or more specimens having occurred in Britain in the autumn of 1876, it is not unlikely that before long this species may gain a permanent settlement here, as it has done in many other lands, notably in Australia.

In the Proceedings, which, together with the President's Address, index, &c., extend to ninety-three pages, there is much to interest all. Numerous specimens, consisting mostly of varieties and monstrosities of Lepidoptera, and new or interesting species of other classes, were exhibited at the Society's meetings: these are all specially referred to. Some valuable communications on stridulation and mimicry were brought forward by Prof. Wood-Mason and others. Our notice is already long, but the following three extracts may be new and of interest to many of our readers:—

Season-dimorphism in Lepidoptera.—"The President read some interesting remarks from a letter he had received from Mr. B. G. Cole respecting some specimens of *Ephyra punctaria* which he had bred from eggs laid by the same female, the greater number of which emerged from the pupæ in July (as the spotted variety), while the remainder appeared in May, in all respects resembling the mother. He repeated the experiment in 1876 with similar results: all but one pupa from a batch of eggs laid in May appeared in July as the

spotted form (males and females), the single exception remaining still in pupa, which it was presumed would appear during the coming May in the vernal dress. In this latter case he had reared a second brood of larvae from eggs laid by some of the July females, all of which were now in the chrysalis state. Mr. Cole added:—"May not the above be considered a case of "season-dimorphism" analogous to that occurring in *Pieris*, *Araschnia*, *Selenia*, &c., as investigated by Dr. Weismann, a slow process of development during the winter being necessary for the May form (which may be considered the type), whilst if the development of the pupa is hastened by the heat (and light?) of summer, the smaller and less perfect individuals are the result? Referring to the similar case of *Selenia illustraria*, Dr. Knaggs (*Ent. Mo. Mag.* iii. 238) remarks as follows:—"It is pretty well known that in the natural sequence *S. illustraria* reproduces itself in the form of *S. delunaria*, and *vice versa*. But what I assert is, that whenever (whether at large, owing to exceptionally hot or long summer seasons, or in captivity from warmth, assisted perhaps by what Mr. Crewe has happily termed 'feeding up quickly') the completion of the pupal stage is accelerated, then *S. delunaria* produces *delunaria*, not *illustraria*. Further, it is my belief that the converse will be found to hold good, *viz.*, that should the completion of the pupal stage be retarded either by cold seasons or climates in a state of nature, or artificially by aid of an ice-well, *S. illustraria*, not *S. delunaria*, would be found to result from *S. illustraria*." And again (*loc. cit.*, p. 256) he puts it thus:—"If *I.* = *illustraria*, *D.* = *delunaria*, and — = winter; then if there be but one brood in the year the sequence will be *I.* — *I.* — *I.*, and so on; if two broods, *I. D.* — *I. D.* — *I. D.*, and so on; if three broods, *I. D. D.* — *I. D. D.*, and so on." I have not yet tried the effect of artificial retardation on the pupæ of *Ephyra*, but intend to do so when opportunity offers. My experiment shows that the effect of natural retardation over the winter months is to produce the type whatever may be the form of the parents; and that such natural retardation does usually (? always) occur in double-brooded species I believe to be true from my experience in breeding various insects. Remembering that the summer broods of season-dimorphic species are smaller, and apparently vitally weaker than the spring ones, and that it is from the former that the latter are usually descended, may we not assume that the provision by which some few of the direct offspring of the spring forms are preserved through the winter in the pupal state, and so are enabled to pair with the offspring of the summer form, is of advantage to the species, in affording a "cross" between individuals which have developed under very different conditions? A similar benefit may be derived in the commonly observed case of individual pupæ of single brooded moths (*e. g.*, *Eriogaster* and many *Notodontidae*) remaining two, three, or more years in that stage, and then eventually making their appearance at the proper season with the ordinary flight of the species. As bearing on the above suggestion, I may refer to what occurs in those single-

brooded moths (*Sphinx Convolvuli*, *Acherontia Atropos*, &c.), which sometimes appear abnormally from the pupa before the winter hibernation, or which by "forcing" have been artificially so developed. It has been stated, I believe, in most such cases in which an anatomical examination has been made, that the ovaries, &c., were found in an abortive or rudimentary condition. This goes to show that a long period of quiescence is necessary to perfect these delicate and highly specialised organs, and by a parity of reasoning it may perhaps be assumed that those pupæ which remain longest in that stage will (*ceteris paribus*) produce the most highly developed and vitalised imagos."—Pp. vi, vii.

Pickles.—"Mr. Douglas, who was unable to be present at the meeting, had forwarded to Mr. Jenner Weir a letter he had received from Mr. R. A. Ogilvie, enclosing specimens of an insect found in great quantities in a jar of pickles (piccalilly). They confined their attacks to the pieces of cauliflower in the jar, which they appeared to relish, notwithstanding the vinegar, mustard, pepper, &c., in the pickles. The species had been submitted to Prof. Westwood, who replied that 'the flies were the common *Drosophila cellaris*, with their curious two-horned pupæ; and they frequent cellars and cupboards, delighting in stale beer, wine, &c.' He supposed that 'the cauliflowers were more to their taste than the other things in the jar, being more succulent and flabby.' In answer to a question put by Mr. Ogilvie, he said that the eggs were laid in the pickle-jar, and not in the vegetables before they were pickled."—P. xv.

Dermestes ravages.—"Mr. W. L. Distant exhibited a specimen of the ravages of *Dermestes vulpinus* (Fab.) in a cargo of dried hides from China. On the arrival of the hides in this country they were found to be infested and gnawed into holes by swarms of the insect in their different stages, causing a damage of from fifteen to twenty per cent. on the value of the cargo. It is not unusual to see this well-known insect amongst these articles, but quite unprecedented to find it in such numbers and causing such an amount of damage. In fact, its appearance had quite paralysed the importation of the hides, and gave further proof of the value of Economic Entomology in the arts and manufactures. Mr. M'Lachlan exhibited a portion of a wooden case containing hides from Shanghai, which was riddled with borings of the larvæ of this beetle."—P. xxii.

At the Annual Meeting in January last a satisfactory report was received from the Council, and the President, Prof. Westwood, read his Address, which gave a general *resumé* of the entomological work accomplished in the past year. The following officers and council were elected for 1878:—President, H. W. Bates; Treasurer, J. Jenner Weir; Secretaries, R. Meldola and W. L. Distant; Librarian, F. Grut; other members of Council, G. C. Champion, J. W. Douglas, Rev. A. E. Eaton, E. A. Fitch, G. Lewis, E. Saunders, F. Smith, and Prof. J. O. Westwood.

OBITUARY.

WILLIAM CHAPMAN HEWITSON.—Born at Newcastle-upon-Tyne, on the 9th January, 1806; died at Oatlands, Walton-on-Thames, on the 28th May, 1878.

Educated at York, and brought up as a land surveyor, the early days of railway enterprise found Hewitson at work under George Stephenson; and he was for some time engaged on the London and Birmingham Railway. But delicate health and the possession of competent means combined to induce him to abandon active employment of this nature. Leaving his northern home he resided for a time at Bristol, thence moved to Hampstead; and finally, in 1848, he purchased some ten or twelve acres of Oatlands Park, and built the house in which his last thirty years were spent. He joined the Entomological Society in 1846, the Zoological in 1859, and the Linnean in 1862.

In early life he collected British Coleoptera and Lepidoptera, and his name is not unfrequently mentioned in Stephens's Illustrations; but for some years he devoted his attention principally to the study of birds' eggs; and in 1833 he made a trip to Norway to discover the breeding places of some of our migratory species. A few notes from his pen on the Ornithology of Norway will be found in the second volume of Jardine's 'Magazine of Zoology;' and other notes on ornithological or oological subjects appeared from time to time in the 'Ibis,' the 'Zoologist,' and other periodicals. But in this branch of Science, as afterwards in Entomology, it was by his pencil and brush, rather than his pen, that he achieved distinction; and for accuracy of delineation and careful colouring of the eggs his 'British Oology' has never been surpassed.

The earliest of Hewitson's entomological notes was on the economy of *Hedychrum* (*Chrysididæ*), and appeared in the 'Entomological Magazine' for 1837. In the summer of 1845 he made an excursion in the Alps, and the result was some "Remarks on the Butterflies of Switzerland" (Zool. iii. 991). From the time of his settling near London, with the facility he thereby acquired for studying foreign species, his passion for Diurnal Lepidoptera developed itself, and he may be said to have devoted the rest of his life to the description and figuring of species of exotic butterflies.

It is needless to say that Doubleday and Westwood's magnificent work, 'The Genera of Diurnal Lepidoptera' (2 vols., folio, 1846—52), was illustrated by Hewitson. This was followed by 'Illustrations of Exotic Butterflies' (5 vols.,

quarto, 1852—77); "a twenty-five years' labour of love," as he himself described it, whilst regretting that age and failing health warned him to bring it to a close. In 1862 there appeared a specimen of a 'Catalogue of *Lycænidaë* in the British Museum,' containing eight plates of *Ogyris* and *Amblypodia*; but the Trustees declined to continue the work according to Hewitson's plan, and he commenced, under the title of 'Illustrations of Diurnal Lepidoptera,' a series of plates of *Lycænidaë*, of which seven parts appeared between 1863 and 1877, the eighth and concluding part being in preparation at the time of his death.

Besides the descriptive letterpress which accompanied these illustrations, Hewitson published numerous memoirs in the 'Zoologist,' the 'Annals and Magazine of Natural History,' the 'Journal of Entomology,' the 'Entomologist's Monthly Magazine,' the 'Proceedings of the Zoological Society,' the 'Journal of the Linnean Society,' the 'Transactions of the Entomological Society;' and in 1869 and 1870 he published as a separate work, 'Equatorial Lepidoptera collected by Mr. Buckley.' With few and slight exceptions (*e.g.*, Proc. Ent. Soc., 1856, p. ii., 1866, p. xxxv.; Trans. Ent. Soc., 1868, p. 97; Ent. Mo. Mag., vi. 96, ix. 161) these papers were simply descriptions of new species, many of which were afterwards figured in the works to which reference has already been made. The list concludes with 'Descriptions of four New Species of *Pronophila*,' which appeared (Ent. Mo. Mag., xiv. 227) so recently as March of the present year.

Hewitson married some thirty years ago, but was soon left a widower and childless. His health compelled him to lead a quiet and secluded life; and thenceforward his sole delight lay in beautifying his grounds at Oatlands, and in adding to his cabinets of butterflies. His ample means enabled him to indulge his tastes without stint. Gathered from all quarters of the globe, brought home by naturalists often sent out for the very purpose, the specimens selected regardless of cost, arranged with scrupulous neatness, and stored in cabinets of superb solidity,—Hewitson's collection of Diurnal Lepidoptera was such as no other man had formed, such probably as no museum ever possessed. Together with some choice pictures and water-colours, and some valuable cases of stuffed birds, he has left it to the nation; and it is presumed that this magnificent and unique collection of *Rhopalocera* will find a permanent and fitting home in the National Museum.

His library of works on Natural History, with a legacy

of £3000, he has left to the Natural History Society of his native town; and the bulk of his considerable fortune is bequeathed to various charities and in legacies to his numerous friends.

His weak health and the seclusion of his life may perhaps have created what to strangers would appear a tinge of sourness in his disposition; whilst a natural slowness to accept new ideas may have led others to impute to him some degree of narrow-mindedness. But in truth he was of a gentle, kindly, and generous nature; and those who knew him best will most deeply mourn his loss. If not a great man, he was at least a good one.

But it is rather with the entomologist than the man that we have here to deal. It cannot indeed be said of Hewitson that he exhibited any breadth of view in scientific matters, or did much to advance the philosophy of Natural History, or to increase our knowledge of the economy even of his favourite group. Confining himself exclusively to a single section of a single order of insects, his writings contain little on the habits of the *Rhopalocera* he figured, little on classification or distribution, little on any of the interesting questions and speculations that give life and charm to Natural Science of the modern school. For these reasons he cannot be placed in the front rank of entomologists; and in truth he never aimed to be more than a describer and faithful depicter of species discovered by others. He was a great lover of Nature and of the beauties of natural scenery, yet he was emphatically a student of the cabinet. His figures, admirable as they are, are the figures of so many butterflies taken out of a drawer,—all wings, set out with provoking uniformity, no leg or palpus visible, no details of structure, without any idea of life: they seem to tell their own tale that they were painted by one who had never seen them in their native haunts, who knew them only as cabinet specimens. But in spite of this want of animation, in his own line as a pictorial describer of butterflies Hewitson stands unrivalled; and whether we look to the folio plates of the *Genera*, or the quarto illustrations of *Exotic Butterflies* and of the *Lycanidæ*, he is fairly entitled to the highest praise, as well for the accuracy and carefulness of his work, and the excellence and beauty of his colouring, as for the patient perseverance with which, for more than thirty years, he followed out his plans.

His epitaph must stand—"PAPILIONUM PICTOR, ET PICTOR PRÆCELLENS."

J. W. DUNNING.



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VARIETIES OF LEPIDOPTERA AT THE NATIONAL ENTOMOLOGICAL EXHIBITION.

THE Editors of the 'Entomologist,' wishing to commemorate the first National Entomological Exhibition, have with this number presented the subscribers with a Plate of some of the most interesting aberrations of Lepidoptera exhibited on that occasion. The following are short descriptions of the specimens figured:—

No. 1. *Clostera curtula*.—The specimen figured is a hermaphrodite; the right side having the ordinary coloration of the female, and the left that of a rare variety of the male. This singular insect was, and is now, in the cabinet of A. B. Farn, Esq. Unfortunately, while this specimen was being drawn for the accompanying plate, the antennæ were accidentally broken off; but they were here depicted before this misfortune happened.

No. 2. *Leucania conigera*.—This insect has the normal coloration of the upper wings; but the left lower wing is both in structure and colour partly like the upper wings, and also has one white spot in the centre. The insect was captured by Mr. W. P. Smith, while mothing, in July, 1877, in Clatter House Lane (near the Welsh Harp), Middlesex.

No. 3. *Chærocampa porcellus*.—A very pale aberration, in which all the rosy crimson of the species is replaced by yellow, and the coloration much subdued. The insect is in the cabinet of Sir Thomas Moncrieffe, and was captured at Moncrieffe by the owner. This specimen is in beautiful condition, and was at the time of capture evidently fresh from the pupa.

No. 4.—This is probably a melanic variety of an *Eupithecia*; it has the ordinary appearance of the species

so obscured that, although the figure is correctly executed, it is quite impossible to recognise the species. The specimen figured, which is in the cabinet of Mr. W. Prest, of York, was bred by that gentleman from among a number of larvæ of *Eupitheciæ* taken at Bishop's Wood, Selby, York-shire. He states that he rears one or two of this curious form each season, from amongst larvæ of *E. albipunctata*, all collected in a like manner in the same large wood. Mr. Prest has named this variety or species, whichever it may turn out to be, *Eupithecia angelicata*, from the *Angelica sylvestris*, on the seeds of which plant the larvæ are found feeding.

Nos. 5 and 6. *Vanessa Atalanta*.—The upper and under sides of this aberration are both figured; the scarlet markings of the upper side of the anterior wings are partially suffused with yellow, and the white spots towards the apex are very large. It is difficult to describe the variation of the under side, but the two conspicuous blue spots are very remarkable. The specimen was bred, September 21st, 1867, by William Smith, of Birmingham, from a larva taken at Aston; and he stated at the time that the larva had gold spots on each segment. The specimen is now in the possession of Mr. F. Enock.

No. 7. *Liparis dispar*.—Mr. Enock, who possesses the specimen figured, bred in the year 1867 upwards of eight hundred males and females of this species, and nearly all had the under wings notched, as seen in the illustration.

Nos. 8 and 9. *Epione vespertaria*.—No. 8 is a very richly coloured male, very much darker than usual, and wanting the usual reticulated markings. It was captured by Mr. Prest, of York, at Sandburn, near that city, July 13th, 1874. This seems to be an hereditary form, for several have been taken in other seasons, in nearly the same place, of the same shade of colour, but none deeper in tint than this example. No. 9 is a male, with the coloration usually found in the female only. It has also the left anterior wing somewhat reticulated, as in the male, but the right anterior wing and posterior wings are like the other sex. This example was exhibited by its captor, Mr. G. C. Dennis, who took it on the well-known *Vespertaria* ground at Sandburn, on July 22nd of last season.

ENTOMOLOGICAL ECHOES.

Contributed by FREDERICK SMITH, F.Z.S.

DURING the course of the publication of the 'Illustrations of British Entomology,' Mr. J. F. Stephens, the author, received communications from numerous correspondents, in which localities and captures of rare and local species were made known, and much valuable information relative to the habits and economy of others was furnished. The letters were given by Mrs. Stephens, subsequent to the death of her husband, to Dr. Gray, who had them bound up in a volume, which he placed in my hands, with full permission to publish any extracts I might make and deem sufficiently interesting. The collection consists of two hundred and twenty-five distinct letters, all treating more or less on Entomology. The greater part relate to Coleoptera, a considerable number to Lepidoptera, and but one or two to Hymenoptera and Diptera. They give accounts of the occasional capture of foreign species, their visits, the mode whereby they reach this country, &c.—this being in some instances inexplicable; but such captures it will be seen have been formerly made, and will doubtless continue to be made occasionally in future.

A remarkable instance of this kind occurred a few years ago, when a Brazilian wasp was taken in three widely distant localities in England. On an excursion to Cornwall I took up my temporary residence at Penzance, and there met with a lady who collected Coleoptera, and was a resident of the place. I had made her acquaintance previously on one of her visits to London. She took the opportunity of my visit to Penzance of asking me to name a few insects she had captured in her own neighbourhood. On opening her collecting box I at once caught sight of a Brazilian wasp. To my enquiry as to where she had taken that particular insect, she at once replied, "In my own bed-room; several of them flew in, and I caught two or three, as I thought it was an insect I had not previously seen. I took those last year, but I have seen others this year during July and August." On making further enquiries I found the window of the bed-room looked into the harbour of Penzance. I expressed my opinion that the wasps had been imported by ships trading with Brazil. My friend made the necessary enquiries, and ascertained that vessels laden with raw hides had entered the harbour. She was told by one of the

captains that as he was sailing down one of the rivers in Brazil these wasps were attracted in such numbers by his savoury cargo as to prove a terrible annoyance to all persons on board, and that considerable numbers of the wasps had continued on board the whole of the voyage home. It was a remarkable circumstance, that subsequently came to my knowledge, that specimens of the same species of wasp, *Polistes biguttatus*, were also taken at Liverpool and in the London Docks the same season.

The above clearly points to the way in which these hymenopterous insects were imported; and we can, on calling to mind the various kinds of freight conveyed from all parts of the world, readily account for the introduction of insects of other orders, some of which, as we well know, have been so long acclimatised as to have taken their place in the lists of our indigenous insects.

Among the letters some have neither date nor address, but are no doubt arranged chronologically; sometimes internal evidence, and sometimes the date of the postmark, supplying the necessary information. The correspondence commences in 1818 and terminates in 1831.

LEPIDOPTERA.

"The swallow-tail, *Machaon*, was found in the caterpillar state feeding on carrots in a garden adjoining some marshes, near Deal, July 7th. It changed into a chrysalis in a few days; and the butterfly appeared in nineteen days.—Miss HARVEY; Upper Deal."

"In your last number I observe you say there is no authentic specimen of *Podalirius* known. I beg leave to state there is one in my possession unset, and taken at Netley; and as there existed doubts about its being a native I have kept it just as I captured it; its larvæ, of which I have had two, feed on the wild white plum tree. One of these days I hope to add it to other collections.—Rev. F. W. HOPE; July 8, 1827."

"An account was sent to you, I believe, by my friend E. Hornor, of the capture of a pair of *P. Podalirius*. The gentleman by whom they were taken, and who resides at Sunderland, says that he caught them several years ago in a wood near Oxford. He showed them to a person who lived near, and he told him that he had seen several of that kind in the same wood. The gentleman who captured them was no entomologist himself, and could not be interested in

palming a deception upon the public of entomologists; and imagined some of *Argynnis Paphia*, which he took at the same time, to be much more rare. One of the insects was in a good state of preservation. I myself see no reason to doubt the fact of their having been captured in England. A specimen of *Sphinx lineata* was taken at Sunderland in the year 1823; and *Sphinx Atropos* was taken buzzing about a beehive in search of its favourite food.—J. O. BACKHOUSE; April 16, 1828.”

“I have taken *Papilio (Steropes) Paniscus* several years, between Woodstock and Enstone; *Polyommatus Cimon (Acis)*, at Coleshill, Warwickshire; *P. (Cænonympha) Polydama*, in abundance on the mountains between Bala and Festiniog, North Wales; also with it, as Mr. Haworth assures me, *P. Typhon (Cænonympha Iphis)*. Last year I saw in a collection, at Coventry, specimens of the beautiful *Europome (Colias Europome)*, which I was told had lately been taken at Dudley. *Antiopa* also has been taken of late years near Coventry; one of the specimens I have seen among them has a yellow border, like the foreign ones.—Rev. W. T. BREE; July 14, 1827.”

“I send you three specimens of *Hipparchia*, being all I have left of the numerous specimens I took on the mountain bogs, between Bala and Festiniog, North Wales, July 21st, 1809. Of these three I have Haworth’s authority for saying that two are *H. Polydama* and one *H. Typhon*, which last is doubtless the reversed specimen. To me, however, it appears to be spinning too fine to separate them.—Rev. W. T. BREE; August 18, 1827.”

“I proceed to make a few remarks on what you state under the head of *Hipparchia Iphis*, and *Polydama*, as relates to myself. Your account, though literally true, may yet lead to error, from the circumstance of your not being in possession of the *whole* truth. The fact is I took a number of specimens of one or both species (for they were in great abundance), but was not aware that they were of more than one kind. Many I gave away; and some years after, our friend Haworth, looking over my remaining specimens (some six or seven, perhaps), observed to me that there was one of a different species from the rest. Now I think it probable that I might have taken more than one specimen of *H. Iphis*, and can scarcely doubt that had a more accurate entomologist been on the spot he might have taken both kinds in some plenty.—Rev. W. T. BREE; April 17, 1828.”

"*Vanessa Antiopa* has several times been taken near Seaton, in the county of Durham, often floating on the water of the River Tees. I think this fly must breed in the salt marshes, and in windy weather be blown into the water. *Hipparchia Blandina* was taken the beginning of this month plentifully, at Castle Eden Dene. This, I believe, is the only place in England where it is found. It was taken there first, I think, four years ago.—THOS. BACKHOUSE; York, 8 mo. 25, 1827."

"*Pamphila comma* I capture in Collingbourne Wood.—Rev. G. T. RUDD; Kimpton, March 18, 1828."

"In Lepidoptera I have been taking *Pamphila comma*; and Mr. Dale has found it at Old Sarum. In May last I took *Acronycta alni* in Collingbourne Wood, Wilts.—Rev. G. T. RUDD; Kimpton, Andover, September 18, 1828."

"During my collecting this year I have met with empty pupæ cases of *Catocala fraxini*; and although I have searched for it (the moth) have not been able to obtain it. Can you inform me the right period of its assuming the pupa state? I have also taken *Endromis versicolora* this year. After *Colias Edusa* has appeared in profusion I believe the reason why they almost entirely disappear the following season is in consequence of their larvæ being punctured by a peculiar Ichneumon which has a predilection for these insects.—D. G. KERRIDGE; Ipswich, October 22, 1828."

"As I passed through Manchester i saw about 100 *Darus* taken at Ashton Moss this summer, without one a proaching in collar on the under side to *Iphis* or *Polydama*; i think they verey much differ from those teaken in Cumberland. I teaken a nother Clifton Nonperiel (*Catocala fraxini*). Seeman has teaken plenty of Purple Emperors, but I dont like to send to him for some for fear he dont send them fine. I left of loosing my time A showing my insects for nothing, as i found in the calculation of time to be a bout a month in 12 month; so now I makes a charge; if they comes to see must pay me for my time.—RICHARD WEAVER (Collector and Dealer); Birmingham, October 29, 1828."

"In the summer of 1820 I discovered several larvæ of *Psyche juxta* at Hornsey Wood, but being then ignorant of its rarity I took little notice of it; but I reared two specimens. In the years '25 and '26 I was unsuccessful in finding it; but in 1827, on the 22nd June and the 4th July, I took half a pint of larvæ and pupæ on the leaves of the hazel, willow, and leaves of young oaks; but although I paid every

attention to them I only bred three males; nearly all the larvæ were infested with *Ichneumon Psyche*, mihi. On the 17th of July I again found young larvæ, but they, case and all, were not larger than this dot (.) ; the cases were made of the down from the under sides of the leaves. I supplied them well with food as long as leaves could be obtained; then I left them to their fate, and soon discovered that they had fastened themselves to the top of the inverted tumbler, having previously covered the sides with a fine web. About the end of March they began to stir, when I supplied them with the buds of whitethorn and sallow; they soon began to increase the size of their cases, adding to them fine sawdust and leaves cut very small. After a few weeks they fastened themselves up as before, and remained immovable; this being about eleven months since they were hatched. In a short time a great number of *Ichneumons* appeared, all quite different from *I. Psyche*. I then examined the cases, and only found in them the shrivelled skin of the caterpillar. In the month of June of the present year (1828) I met with abundant larvæ and pupæ, and collected a large box full. In the beginning of July the perfect insects began to make their appearance, but I only obtained four males and two females. I have also found them in Highgate Wood. It is past a doubt with me that the larvæ are two seasons coming to perfection. This may account for so many being stung by the *Ichneumon*.—A. INGPEN; November 24, 1828."

"Enclosed is a wing of *Lophopteryx carmelita*. I have no doubt of it, as it agrees with the figure and description in thy work. I found it in Ongar Park, on the 22nd of April, 1828. *Thyatira batis* is by no means an uncommon insect here.—HENRY DOUBLEDAY; 5th Month 15th, 1829."

"*Endromis versicolor* has been taken this year in Suffolk, by Mr. Kerridge, a chemist, of Ipswich.—Rev. WM. KIRBY."

"I may mention that *Papilio (Arge) galathea* was plentiful about St. Margaret's Bay, near Dover: this was in 1798 and 1799. In 1804 the captain of a vessel brought me a death's-head moth, which he saw fly and settle in the sails when he was several miles from shore, near the mouth of the Bristol Channel. They are plentiful about once in seven years about Swansea.—L. W. DILLWYN; October 12, 1829."

COLEOPTERA.

"I have lately added to my collection two splendid specimens of *Calosoma sycophanta*, and with them have heard

some interesting accounts. One of them I obtained of a fisherman, who says that he took it in his net at sea, alive, between thirty and forty miles off this coast; and upon enquiry I have heard of several others taken in the same way. The fishermen tell me that they live at sea feeding upon fish; and one man assures me that he has kept one many days which fed upon mackerel.—W. C. HEWITSON."

"We meet with *Carabus nitens* on Stockton Common, four miles from York; and *Nebria livida*, under stones, on the sea-shore to the north of Scarborough Castle, the beginning of June.—THOS. BACKHOUSE; 25th 8 mo., 1827."

"Having read in Mr. Samonelle's book that *Notoxus monocerus* is a rare insect, I write to say that I have lately taken several in a lane between this place and Richmond, called Sandy Lane; and a young friend in company with me discovered about twenty feasting voluptuously upon the body of *Meloë proscarabæus*. In addition to the former notice I may add that I caught *N. monoceros* repeatedly in the fly-net by accident, they were in such abundance.—THOS. P. HAVERFIELD; April 30, 1828."

"I may add as to *Rhinobatus ebeneus* (*Larinus carlinæ*) it occurred in great plenty last year at the edge of Collingbourne Wood (near Kimpton) the beginning of August, but I did not know its value, and so failed to secure more specimens than the two I sent.—REV. G. T. RUDD; July, 1828."

"Respecting the *Stylops* I may inform thee that I bred four specimens from a species of *Andrena*, very common here on the whitethorn in May, but do not know its specific name.—HENRY DOUBLEDAY; Epping, 9 mo. 2, 1828."

"Mr. Dale tells me that he has taken larvæ of three new species of *Stylops*, besides the species Curtis has given. He complains sadly of the past season, and seems to have done little except in *Stylops*. In Coleoptera I have taken *Licinus depressus*, twelve males and three females during last month and up to this date; I have also taken *Buprestis viridis*, three specimens; also *Elater cupreus*; *Elater bipunctulatus* was very common in the winter; also *Crioceris nigra*, Marsh. (*Erga atra*). Mr. Dale has at length hit upon the method of breeding *Stylops*, and says that he considers it one of our commonest British insects!—REV. G. T. RUDD; Oct. 21, 1828."

"As to *Stylops* I am concerned to say that I had, by an accident, four specimens destroyed, all of which I had hoped to have sent to you. It is, however, so common an insect,

that, if we live, I can I dare say send you a dozen specimens next season.—Rev. G. T. RUDD; May 18, 1829.”

“*Licinus cassideus* was taken at Aldborough, Suffolk, in 1824. It is in the British Museum. *Epomis circumscriptus*, in meadows at Netley. *Necrophorus germanicus*, Lord Abingdon’s Wood, near Oxford.—Rev. F. W. HOPE; 1828.”

“*Hamaticherus heros*, on trunk of an elm, near Colney Hatch.—A. INGPEN; November, 1831.”

“I have been taking *Polydrosus sericius* freely, and also *Elater (Cardiophorus) thoracicus*, in Littleton Copse.—Rev. G. T. RUDD; Kimpton, June 1, 1829.”

“I take the following insects in the neighbourhood of Bristol:—*Cerambyx (Lamia) textor*, *Scarabæus (Copriss) lunaris*, *Scarabæus (Bolbocerus) mobilicornis* (in Lord Clifford’s Park), *Curculio (Platyrhinus) latirostris*; and at Lundy Island, *Scarabæus typhæus (Typhæus vulgaris)*.—GEORGE WARING; Bristol, June 21, 1829.”

NOTE.—This insect is not in the list of Coleoptera of Lundy, given in Mr. J. R. Chanter’s ‘Monograph,’ lately published.

“I find *Nebria livida* in plenty near Redcar, Guisboro’, Yorkshire; also *Dischirius nitidus* in profusion, and a species the size of ‘*nitidus*,’ but it is castaneous and opaque; *Bledius tricornis* is in profusion; *Notoxus monoceras* is also here in profusion. What have you made of the insect I sent you like *Oiceoptoma thoracica*, but with the sides of the thorax angulated? I found it at Amesbury.—Rev. G. T. RUDD; Redcar, Guisboro’, Yorkshire.”

“In consequence of the summer having been so very wet I have done very little in collecting, but have added a few insects to my cabinet, amongst which are *Apate capucinus* and *Lamia (Monochamus) sartor*. I saw at Yarmouth, in the possession of Mr. Paget, a specimen of *Tenebrio (Blaps) gigas*, taken by his friend Mr. Williams, of Ipswich, under the bark of a tree. Curtis says that Mr. Griesbach also has one.—JOSH. SPARSHALL; Norwich, October 24, 1829.”

“*Saperda ferrea (Stenostola nigripes)*, taken abundantly here in June, 1828; but last summer sparingly; it was taken previously at Manchester.—GODFREY HOWIT; Nottingham, December, 1829.”

“I shall now mention a few of my recent captures:—*Odacantha melanura*, in plenty in the sedge boats; *Dromius sigma*, in moss, Midingley Wood, near Cambridge; *Colymbetes Grapii*, near Cambridge; *Platyrhinus latirostris*, Bath,

in *Sphærea fraxini*; *Prionus coriarius*, Misley, near Cambridge; *Saperda carciarias*, Cambridge.—CHAS. C. BABBINGTON; St. John's Coll., Cam."

"I have taken the liberty of sending you the localities of some insects:—*Pogonocherus nebulosus*, Rose Castle; *Pogonocherus hispidus*, Botchardby Mill; *Saperda oculata*, Baron Wood; *Pachyta octomaculata*, Baron Wood.—T. C. HEYSHAM; Carlisle, July 5, 1831."

"I have just finished A case of Insects that i ham going to Present it to Hir Royall Hiness Princess Victoria to sollicite the feavour of hir neame as one of the peaterons of my Museum. The Insects are in a gilt freame, and the freame fitts in a Case meade in the sheape of a large Book, full bound in red and ornemended with gold, with the jeneric and specific Neames a fixt to each, and a Peaper with the jeneric and spc. Neames ritten, and the diffrent Countys I have collected them in, and Neamed by Mr. Stephens.—RICHD. WEAVER; Birmingham, August 28, 1830; Museum, 38, New Street."

ENTOMOLOGICAL RAMBLES, 1877.

By J. B. HODGKINSON.

(Continued from p. 113.)

DURING the first week in August I captured several worn specimens of *Coccyx nanana* by beating the spruce in the Hon. F. Stanley's plantations, at Witherslack, on the bank opposite the "Derby Arms," in the afternoon sunshine. *Asychna profugella* was flying rapidly about, but scarcer than usual. There were still a good number of plumes out,—*Pterophorus plagiodactylus*, *P. parvidactylus*, *P. tetradactylus*, and *P. bipunctidactylus*; this latter is a much later species than the others: indeed last season there seemed to be no fixed time for insects appearing; they came out in dribblets. The females of *Zelleria hepariella* (*insignipennella*) were now out, and would be until March following. The males of this species are soon over, though the females may be beaten out of the yews all winter, and varying from pale yellow to rich red; one most extraordinary thing is I have never as yet found a male with any variation worth note. Had I not frequently taken what should be *Z. insignipennella* in copula with *Z. hepariella* I might not have been so sure that they are both one species. Very few moths were

stirring; though plenty of *Crambus falsellus*, *C. geniculellus*, *C. inquinatellus*, and *C. pinetellus* are to be dislodged out of the old hollies and yews. Geometra few; Noctuæ only odd specimens. *Mamestra furva* and *Cerigo cytherea*, &c., beaten out from under the banks. I did not try sugaring, having to be careful about rheumatism; but during the afternoon sunshine *Dicrorampha acuminatana*, *Gelechia atrella*, *G. gemmella*, and *G. anthyllidella* were flying actively about; and odd *G. junctella* got up; this species still keeps very rare, and is one of this genus which hibernates.

During the whole of August and September little or nothing of importance turned up amongst imagos. Most of the time was employed in larva hunting, chiefly for *Nepticula*; and among the larger species I met with several *Cucullia asteris* larvæ on the golden-rod, and also on the China-aster. The first I found were in a garden. I had a strange adventure with a *Cucullia gnaphalii* larva: I let one feed on a plant of the golden-rod in my room, subject to no other confinement; it never offered to leave the plant for a fortnight; but when I had been absent for three days, on my return my "shark" was gone. I looked everywhere in the room, still hoping it would crawl out of some corner, until at last it was given up. Several days after, my servant was making her bed in another room some distance away, when she brought my lost one back, having found it under her pillow, apparently preparing to change. After that it was put under restraint; and I expect to see it creep up shortly out of my flower-pot in another form. I met with an *Acronycta alni* larva at Grange, as did Mr. Threlfall; mine was sickly, and looked as if it was ichneumonised. Of *Botys terrealis* larvæ I got a good supply, but it is a most difficult species to rear. I find it best to let them ramble about in my room, and go to pupa where they please, for the moths always go to the window. It was very lucky that I took all I could find on all the plants in one locality, for the railway company are making invasions on a special corner, where both *B. terrealis* and *Eupithecia denotata* larvæ are; and where the latter might be found in scores on the seeds of *Pimpinella saxifraga*: some of the larvæ were green where the seeds were green; and, later in the season, when the seeds were brown the larvæ were chiefly brown; evidently a provision for self-protection. On visiting this special corner recently I found it was covered and filled up with some twenty feet of soil, and railway rails laid over the spot. There are also

large mansions being built on my *Aspidiscana* ground. One by one my happy hunting grounds disappear; and we have to go forth again to find "fresh woods and pastures new."

I had long wanted to see the larva and case of *Coleophora melilotella*; so during the first week in September Mr. Threlfall and I set off for Darlington. After a five hours' railway ride we found ourselves at Barnard Castle; and having missed Mr. Sang we strolled into the town, and found a bird-stuffer who had only about a score of moths; and how odd that one should be a fine *Sphinx convolvuli*, and another the handsome little *Anesychia funerella*. That evening we put up with Mr. Sang; and next day he took us on to the railway bank and showed us how to find the cases of *C. melilotella*, which are by no means easy to find: it is just like the dark seeds of the *Melilotus*; and now and again three cases would be sticking end to end. There we saw several larvæ, which Mr. Sang picked up for us to show how they fed, such as *Nepticula cryptella*, *Gelechia intaminatella*, &c. On the day following we all three went to Highforce, Middleton-in-Teesdale, some twenty-five miles from Darlington, and found a number of larvæ of *Coleophora Wilkinsonella* and *C. paripennella* on the birch. The rains had beaten everything down. We went specially to look for the rare *Acrolepia betulella*, but it was no use; though every little moth we beat out was soon caught. The best were *Mixodia Ratzburghiana*, some in fine condition. These ought to have been out in July.

We parted with Mr. Sang at Barnard Castle, having spent three days greatly to our advantage in knowledge. Nothing surprised me more than to see that such an unentomological looking district had yielded so many novelties as Mr. Sang had turned up, such as *Gelechia solutella* (a Rannoch species) and *Elachista paludum* (a Norfolk fen species); but it is the old adage which stands as good as ever,—“He who works will win.”

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MATE'S 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 147.)

89. *Cynips caput-medusæ*, Hart.—This remarkably fine gall first appears with the opening of the fruit buds in May. In the neighbourhood of Vienna it occurs in such numbers

on the young twigs of *Quercus sessiliflora* and *Q. pubescens* that they are often bent down by them. A thick disk is developed on one side of the cup, the edge of which is at first surrounded with small conical projections, but the upper surface very soon becomes covered with numerous, more or

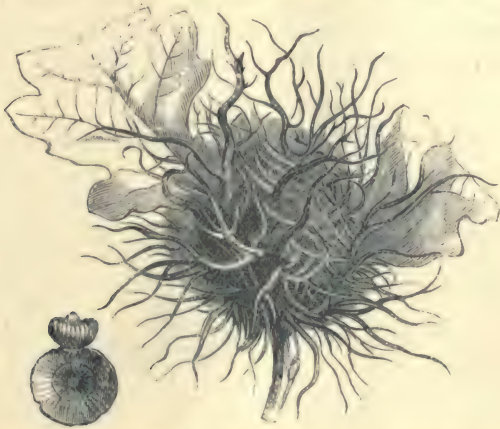


Fig. 89.—Gall of *Cynips caput-medusæ*, and cup with the inner gall.

less bent, red thread-like growths, which are pointed at the ends, and bear a great resemblance to the tentacles of a sea-anemone (*Actinia*). In some cases the disk does not widen, but the edges are turned inwards towards the base, whilst the protuberances grow on, and numerous thread-like side branches are produced, which spread themselves in all directions, so that the disk becomes quite hidden, and when the gall matures scarcely more than these are noticeable. In the centre of the disk there is transversely a thin-walled, single-chambered inner gall, which is separated from the surrounding gall substance when ripe. Several galls often grow so near together that they appear like a single gall, as large as a man's fist. The galls become mature at the beginning of winter, and during the cold season a great many fall off the trees, but many remain. From both the flies appear in February: these are best to be obtained by collecting the inner galls at the end of January.—G. L. MAYR.

We now come to the sixth and last division, namely, the fruit-galls,—those species which produce galls either on or in the fertile flower, or acorn. It is doubtful whether any of

the four or five European species occur in Britain. The fine Bedeguar-like gall, now under notice, would certainly be recognised, and it is unrecorded; but if it has been found the beautiful figure may recall it to mind. No less than four species of *Synergus* are known to make a home of this gall, amongst others; *Olynx trilineata*, Mayr, and the two common species of *Megastigmus*, viz. *M. stigmaticus* and *M. dorsalis*, are parasitic in it.—E. A. FITCH.



Fig. 90.—Gall of *Cynips calicis*, and in section.

90. *Cynips calicis*, Burgsdorff.—The well-known “Knopper”—which occurs on *Quercus pedunculata* and, according to Schlechtendal, also on *Q. sessiliflora*—is the nearest relation to the above-described species. The gall appears at the beginning of summer, between the acorn and the cup, at the bottom of the latter, forming at first an inverted cone or a thick disk, which becomes hemispherical by degrees; it is strongly ribbed radiately and compressed at the side, a rounded papilla appearing at the apex. The margin of the disk, however, soon becomes more and more curved downwards, and the involucre more or less surrounded. There is a hole at the central point from which the radial striae emanate, and which corresponds to the apex of the gall: this is the mouth of a cavity, which is divided from a second cavity at the base of the gall by a transverse partition. This inferior cavity contains the single-chambered inner gall, apparently loose. The gall-fly leaves the inner gall in February or March, and eating through the above-mentioned partition makes its exit by the hole opposite the base of the gall.—G. L. MAYR.

The Knopperrn galls do not occur with us; five species of *Synergus* and *Megastigmus stigmaticans* are connected with them. Like the gall-maker all are to be bred in the spring and early summer of the second year. The economy of *Synergus vulgaris* in this gall is interesting.—E. A. FITCH.

THE GREEN FIELD-CRICKET (ACRIDA VIRIDISSIMA).

By W. G. TENANT.

On August 14th, 1876, a friend gave me a male specimen of this interesting and handsome insect. I made a house for him—consisting of a box, the top of which, instead of having a lid, was nearly covered by a pane of glass—for the purpose of observing his habits; over where the glass did not cover I fastened a piece of perforated zinc, thus admitting both light and air.

Amongst his habits, which under these circumstances did not seem to be multifarious, the commonest one was the licking of his tarsi, which, by the way, I suspect was often done for the purpose of making a sure footing in walking; and especially would he do this while walking, body inverted, on the under side of the glass cover of his house, for I observed that when he apparently failed to adhere to the glass, and he was in danger of falling to the bottom, then he would lick the tarsi; after which he was enabled to pursue his course in safety. So often as the tarsi appeared to fail to adhere, so often did he place them in his mouth; and from this fact I have very little doubt but that the secretion with which he moistened them enabled him to walk, body inverted, with safety. I can hardly suppose it was so often done for the purposes of cleanliness only.

He was ravenous at times, killing and eating a moth (*Tryphæna pronuba*), though, so far as I observed, he never seemed to notice their presence, and only attacked them when they approached him. With his mandibles he scooped out the contents of the abdomen, seldom mutilating to any extent the integument. A mischievous urchin placed a humble-bee in his cage, which I allowed to remain, though not with any easy mind, being afraid it might sting and hurt the cricket. Very soon afterwards, however, I was surprised to find the bee lying helpless at the bottom of the cage: how

it had become so I did not know; but I had seen the cricket strike the bee when it fluttered near him; yet I hardly imagine those blows were sufficient to render it *hors de combat*. Some little time after the cricket inserted his mandibles in the abdomen of the bee, and, having succeeded in abstracting the honey-bag, forthwith proceeded to eat it, leaving the bee still alive. I allowed the bee to live two or three hours, thinking the cricket would return to it to eat the contents of the abdomen; but he did not; and finding he had no apparent intention of so doing, I killed the bee. Butterflies he was immensely fond of, allowing them to live very little time after being placed in his cage. In no instance, however, did he eat the wings and head of either moth or butterfly. He lived until September 25th.

Two days after the cricket died a lad took it out of its cage, where I had allowed it to remain, and began handling it. Boy-like, and for no other purpose but pleasing himself, he expanded its elytra, and then by the application of his fore finger and thumb compressed them sharply. I was surprised to hear a distinct chirp,—a more distinct one than which the cricket himself could not have produced had he been alive. I repeated the act, succeeding at will in producing the chirp. This led me to examine the elytra to ascertain, if possible, how the chirp was produced, and with the following result:—

On the upper surface of the under wing-case will be found what may well be compared to the head of a drum: its appearance is vitreous, and it is surrounded by a membranous ridge; on the under surface of the upper wing-cover a depression exists, showing where this so-called drum-head meets the upper wing-cover when the elytra are closed; anterior to this depression is a ridge so set that, while the elytra are being closed, it chafes against the anterior left and free end of the under wing-cover. This chafing or friction produces the chirp. The edging of the under wing-cover where this friction takes place appears to be composed of the same membranous substance as the ridge of the upper wing-cover, just mentioned.

My opinion is that the chirp is produced by a rapid closing of the elytra, and not by their expansion; and if this be true it will account for the chirping not being one prolonged sound (as in the case of whistling), even when the cricket is chirping its loudest and fastest. That the cricket moves its elytra when so doing is without doubt correct;

and Mr. Robert Laddiman, of this city, assures me that he has repeatedly observed this action. As the ridge upon the under surface of the upper wing-cover, when the elytra are closed, rests in a position anterior to the before-mentioned drum-head of the under wing-cover, it would appear that the membranous ridge surrounding the glassy surface of the drum has not by any friction of its parts anything to do with the production of the chirp; and I think it probable the drum-head is an apparatus for the reflection of the chirp-sound in any direction, and at the will of the cricket, for it is well known that the insect is not always to be found in the spot from whence its chirp appears to proceed. As the male bird sings for the delectation of the female and to attract her attention, so undoubtedly does the male cricket chirp; for the female cricket possesses no such apparatus as I have described, and as far as I can ascertain does not chirp.

As the time is at hand when this beautiful insect is in full vigour of life and song, and may be easily obtained, it would be well if some of the readers of the 'Entomologist' would secure specimens, and see if they can or cannot substantiate my foregoing remarks on the singing of *Acrida viridissima*.

Upper Rupert Street, Norwich.

NOTICE OF BOOK.

The Natural History of Hastings and St. Leonards.
Published by Hastings and St. Leonards Philosophical
and Natural History Society, 1878.

THIS little work consists of a mere list of names of all kinds of animals and insects which have been observed in the neighbourhood of Hastings, both on land and in the sea. Excepting that it gives the relative abundance, or scarcity, of each species, it is little more than a mere list of names, without localities or any information which would be of use to the comparative naturalist. Nevertheless it forms a good basis upon which to found more useful work. The order Insecta occupies about twenty-four pages out of sixty; and all orders seem to have been fairly worked out.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LIFE-HISTORY OF DEIOPEIA PULCHELLA.—The history of this beautiful species, as given in our English works on Lepidoptera, being only a short and imperfect account, copied from continental authors, and as I have just been favoured with the rare opportunity of rearing this species from the eggs (for the first time, I believe, in England), the following notes may be interesting. The eggs were most kindly sent me by Mr. Joseph Sidebotham, who had been staying for some months at Mentone, Alpes-Maritimes, in which locality he had the pleasure of seeing *Deiopeia pulchella* on the wing, in October, 1877, when he got eggs, which duly hatched, but the young larvæ refused all kinds of food offered to them. During May, this 1878, the imagines again appeared, and Mr. Sidebotham secured some eggs, which he sent to me by post to try my fortune with them. They reached me May 24th, and some of them had hatched *en route*. The remaining eggs produced larvæ the day of arrival. Mr. Sidebotham writes to me:—"I find *Pulchella* round here (Mentone), from the sea level to an elevation of one thousand feet, at which height it is found on the rosemary, a large white-flowered *Cistus*, or rock-rose, and on pine trees; at the sea level, where it is more abundant, it frequents myrtle, *Trifolium stellatum*, *Cytisus scorparius*," &c. Here too, in England, it shows a partiality for the coast, a few occurring most seasons along the south-west coast, from Kent to Devonshire. When first hatched they are of a dull orange-colour, slightly hairy, sluggish, and of rather a maggot-like appearance; the head is small and black. The first casting of skin was on June 3rd, when they became darker coloured, and of a greenish black tint, the segments being well defined, a transverse dull orange band and six black spots on each, and a few black bristly hairs. The second moult, *i.e.* on third skin, the transverse orange bands become less defined, and an interrupted chain of white dorsal spots appear; these spots are of varied characters, largest in the centre of each segment, decreasing both anteriorly and posteriorly, and a spiracular line also appears of a whitish gray colour, the spiracles being of a dull orange. About June 17th the third and final moult took place; and in this stage they varied very much in different individuals. By taking the most marked forms, or varieties, you might

roughly describe the darkest type as a black larva, with an interrupted chain of white dorsal spots, and with a more indistinctly defined whitish spiracular line; whilst the paler type might not inaptly be called a creamy white larva, with transverse bands of markings: these transverse bands are composed of a fine dull orange band (quite lost in the dark form), bordered on either side by largish black dots, just touching on their outer margins, four of these spots being larger than the rest; two on either side of the orange bands are on the dorsal area, and by the strong contrast of jet-black on the creamy white ground form the broadish, irregular, chain-like pattern of the dorsal area; smaller black spots, with a little gray shading, produce a faint spiracular line; the spiracles being dull orange, which on the anterior segments show rather more of the orange colour. The larva is thinly covered with stiffish hairs; those of the dorsal area being black, and those of the spiracular area white. The ventral surface is dull lead-colour in all of them. When full grown they measure one-eighth of an inch, are moderately stout, slightly thickest in the middle, decreasing a little to each extremity; the head is rather small, and of a mottled brown colour; the segments are well defined. As to treatment—when first hatched I placed them in a wide-mouthed bottle, and tried them with a variety of likely plants; and I had the satisfaction of seeing that they ate a garden variety of *Myosotis*, and also *Borago officinalis*; by preference the former plant, but being an early flowering species it was getting out of flower and much covered with *Aphis*. I tried them with the common forget-me-not (*Myosotis palustris*), of our brooks, and they took to feeding on it at once, eating both flowers and leaves, and thrived well. They were full fed from June 24th to 30th, when some of them commenced spinning a fine white silky cocoon on the surface of the ground, introducing a few grains of earth, &c., into its composition, so as to give it the character of surrounding objects, doubtless for protection. Others spun in like manner. Three of them spun a fine white web amongst the food-plant, through which could be seen the moderately stout, reddish brown pupa, showing a slight indication of the spots on the abdominal surface of the imago. The first imago appeared, July 16th, a fine female; another on the 17th; and a very large male on the 18th. The coloration of the first is extremely bright, the crimson spots being both large and deeply coloured. In the two last the crimson is less bright,

and in fact quite of our English type, allowing for the fine condition of being freshly bred. Should any fortunate collector meet with a female *Deiopeia pulchella* on our English coast this year, I hope he will give her a chance to supply him with some genuine "native" eggs before consigning her to the cyanide bottle; and then possibly my experience may help him to success with them.—WILLIAM HENRY TUGWELL; 3, Lewisham Road, Greenwich, July 18, 1878.

ACHERONTIA ATROPOS.—In August and September of last year I had a dozen larvæ of *Acherontia Atropos*, all of which were found feeding on potato-leaves. The ground colour of the whole of them was green. In due course they turned into pupæ, and with the exception of two went down into earth, finely sifted and placed in flower-pots for their especial behoof. The two alluded to refused to bury themselves, and underwent their metamorphosis on the top of the earth, one of them emerging an imago in November. This was a very noisy insect, squeaking loudly in the three stages of larva, pupa, and imago. The other, though the moth was perfectly formed, died in the pupa-case. November passed, and December, and I then gave up all hope of seeing any more autumnal specimens. I knew from experience what a troublesome creature the moth is to rear; and many of my entomological friends gave me little encouragement as to their appearing in the spring. However, I did not despair; but kept the breeding-cage, in which I had put the flower-pots, before the kitchen fire. April came and no moths; therefore I determined to turn them all out and satisfy myself whether they were alive or dead. Fortunate resolution this: I found the earth, which I had taken such pains to pulverise, cemented into a hardness rivalling a macadamised road. Alas! one poor moth had burst from the pupa, only to perish miserably in its "living tomb," the mould being so hard that it could not possibly push its way to the top. It would have been a splendid insect, judging from the size of its body. I then carefully examined the others, two of which I discovered were dead. The remainder I took up and laid in moss, and still kept before the fire. About the middle of June, when the weather became intensely hot, I carried the cage into the greenhouse, thinking that the sun's heat would be better than artificial. A few days after, namely, on the 18th of that month, great was my delight to find a fine male had emerged. Of course I then paid not only daily, but frequent, visits

to the cage; and on the 23rd found another male. The next day a large female emerged; on the following day, another male; on the 28th, another male; on the 29th, another, a male likewise. My last specimen was delayed by the sudden change in the weather till the 5th of July, when it came out; making the sixth male, and eighth fine specimen. Each of these insects squeaked loudly,—louder than a mouse when a victim to the tender mercies of a cat.—JOSEPH ANDERSON; jun.; Chichester.

ANTICLEA SINUATA AT BOX HILL.—On July 21st, whilst collecting at Box Hill, I was agreeably surprised at beating a fair specimen of *Anticlea sinuata* out of a box tree.—A. W. PRIEST; 16A, Merton Road, Stamford Road, Kensington, July 22, 1878.

RARE TORTRICES THIS SEASON.—While collecting near Leatherhead on April 27th last, in company with Dr. Gill, I captured a specimen of *Spilonota pauperana* flying in the sunshine over wild rose bushes; it was slightly worn, and its late appearance was probably the reason why I failed to find any more: so far as I am aware this is the first record of the capture of this local species in Surrey. On May 25th, at Tilgate Forest, I took one *Ephippiphora ravulana*: the day was very showery, and this was almost the only insect to be seen during a passing gleam of sunshine. I have succeeded in rearing a few *E. gallicolana*, and have also taken two specimens of this species, which I consider to be identical with *E. obscurana*, though I must postpone my reasons for this decision to a future number.—WALTER P. WESTON; 1, Duncan Terrace, N.

GELECHIA GERRONELLA BRED.—I have bred two specimens of this from larvæ collected in furze bushes, near Snaresbrook Station, in the early part of June. They came out amongst a number of *Grandipennis* at the end of June and beginning of July. I subsequently went over to the place, and beat from the furze ten good specimens of *Gelechia gerronella*. *Anarsia spartiella* and *Cemiostoma spartifoliella* were both common.—W. MACHIN; 22, Argyle Road, Carlton Square, E., July 18, 1875.

RHODOPHÆA CONSOCIELLA AT ARNSIDE.—A month ago, when looking for larvæ of *Penthina incarnatana*, I noticed the young oaks all crumpled up in a form I had not seen before: I thought they could not be the common Pea-green, *Tortrix viridana*, but that possibly they might be knot-horn larvæ; however, I sent two to Mr. Barrett for an opinion. As he

sent none I concluded they were some common thing after all. I had filled my inside pockets with leaves; and judge of my surprise when *R. consociella*, but many of them crippled, began to appear in my room. I wetted all the leaves again, and bred about thirty-five specimens. This is the first occurrence in the North of this insect.—J. B. HODGKINSON; 15, Spring Bank, Preston, July 17, 1878.

INCURVARIA CANARIELLA BRED.—I have bred several specimens of this rarity from *Rosa spinosissima*, which I found at Arnside. This is the only English locality; but it has also occurred in the Isle of Man, where my old friend Hague, of Staleybridge, first took it twenty years ago. This new district of Arnside has, as I expected, shown up well, being a high hill above the sea; but as the wind is always blowing, more or less, it gives one a poor chance of collecting.—Id.

DESCRIPTION OF THE LARVA OF BOTYS ASINALIS.—On May 11th, 1876, I received through the kindness of Mr. A. E. Hudd, of Clifton, Bristol, half a dozen larvæ of this species. Two of them were full grown, and were an inch and an eighth in length; the middle segments plump and round, but each becomes smaller than its predecessor from the middle to the extremities, giving the body a strongly attenuated appearance. Head broad when seen from above, but narrow when viewed from the side; the lobes rather rounded and polished. Body irregularly cylindrical, each segment tapering towards its edges, and thus rendering the divisions very conspicuous; each segment is also further divided into two parts by a central transverse groove. Skin soft and semitranslucent, clothed with a few short hairs. The last pair of prolegs are extended in a >-like form beyond the anal segment. Ground colour dull pinkish brown (brighter in young specimens): head straw-colour, marked with darker brown; dorsal stripe pale pinkish yellow, intersected throughout with a dark olive-brown line; sub-dorsal stripes also pinkish yellow, broadly bordered above with olive-brown; indeed, this dark colour forms a broad stripe between the dorsal and subdorsal lines; spiracles and trapezoidal dots distinct, black; ventral surface, legs, and prolegs, grayish green. The skin is so transparent that the movements of all the muscles can be distinctly seen. Feeds on *Rubia peregrina*; and in some seasons the larvæ are so abundant in the neighbourhood of Bristol that the conspicuous marks made by them on the madder plants form quite a

feature in the locality.—GEO. T. PORRITT; Highroyd House, Huddersfield, July 4, 1878.

NOTE ON PROTECTED COLEOPTERA.—To the list of specially protected insects we may, I think, venture to add *Pyrochroa coccinea*. Several specimens which I have thrown to poultry have been decidedly rejected: its boldness is as well-marked as its coloration is striking. It is, by the way, a destroyer of *Aphides*; and so are *Malachius æneus* and *M. bipustulatus*. A few days ago I was hastily called to look at a "wasp without wings," which had been imprisoned under a tumbler. It proved to be a large specimen of *Clytus arietis*. The boldness of this insect, and its indifference when a hand is put forth to seize it, as I have frequently remarked this season, show that its wasp-like coloration proves, under ordinary circumstances, a sufficient protection. In this respect it differs strikingly from *Callidium violaceum*, a common species here, which on the least approach of danger disappears round the post, rail, or branch, upon which it is sitting, with admirable neatness and speed. My experiments show that it is not protected by any repulsive odour or taste, as it is readily devoured by birds.—J. W. SLATER; 3, Bicester Road, Aylesbury, July 6, 1878.

ON PARTHENOGENESIS IN THE TENTHREDINIDÆ.—The result of the experiment recorded by Mr. P. Cameron (Ent. Mo. Mag. for June last) induced me to try the same experiment with another sawfly, *Eriocampa ovata*, which enables me to corroborate the result obtained by that gentleman. When I saw the article above alluded to I determined the first opportunity to try the same myself; as I had several bottles containing sawfly pupæ I had not long to wait. I keep these bottles in my bed-room: on getting out of bed on June 23rd I looked at the bottles; there were no sawflies in any of them; but before I had finished dressing a female was crawling up the side of one of the bottles, which I immediately boxed; and a few minutes afterwards another, which I likewise boxed. Having secured them in separate boxes I went out and procured a spray of alder; this I got from a cold sheltered spot, with a north aspect, as being least likely to have the leaves already punctured by sawflies. I put the sprig of alder into a bottle of water, and that under a bell-glass; I then tried to put the two female sawflies under it, but as it was in the sun, and on a very hot day, they were very active, and one of them escaped, for which now I am not sorry; the other no sooner flew on to the leaves than she

began to lay, or at least puncture the leaves: this she did in the following manner:—she walked slowly about the leaf, restlessly feeling the surface with the end of the sheaths of the saw; this she did by continually drawing the saws to her by bending her abdomen; when she was satisfied with the spot, the saws were lowered nearly at right angles to the abdomen; a starting point was evidently then made; after which the body was turned on one side, and the saws gradually forced sideways into the leaf, until the abdomen reached quite close to the surface; she then remained quiet a very short time, and gradually withdrew the saws again: it seemed to me that the blades of the saw were opened before and whilst being withdrawn, exactly in the same manner as a glove-stretcher is used; the motion of the saw whilst puncturing the leaf was a succession of short pushes, and a very slight withdrawal before each push; the operation took somewhere about half a minute; the eggs were laid, or at least the punctures were made, in quick succession. The fly died about the middle of the week, most probably from starvation. When the leaf was punctured the entrance of the hole could clearly be seen with the aid of a glass; it had the appearance of a small bruise. On Friday when I went to give the alder more water I noticed that some of the leaves were covered rather thickly with brown spots. On the evening of June 30th, on going again to water the sprig, I was struck with the appearance of the leaves; and on using the lens I found that the eggs had hatched, and young larvæ were crawling about the leaves. The brown patches were now in holes, having been eaten through. Of course it is just possible that the leaves may have had the eggs deposited in them before I cut the sprig, but from the situation from which it came I do not think it likely; or at least if an *Eriocampa ovata* should have laid its eggs in the leaves, I do not think she would have laid so many in a leaf as there are in the leaves of my sprig. To be quite sure, in such a case, the alder should have been protected from any chance of visitation from a strange sawfly before the experimental one was introduced; still I feel perfectly satisfied myself with the results of the experiment. I may say I have not yet met with the male of *Eriocampa ovata*; and I am quite positive this female never saw one. Since the above was written the leaves got rather dry in the night, and most of the young larvæ left the leaves, and as these were not covered they escaped.—JOHN B. BRIDGMAN; Norwich, July 3, 1878.

THE ENTOMOLOGIST.

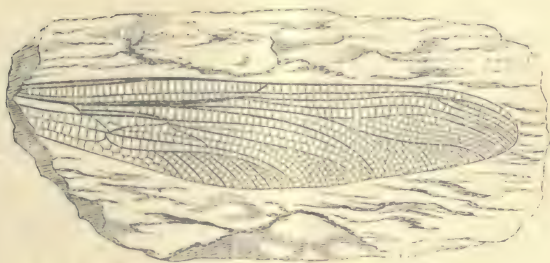
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[No. 184.]

NOTES ON A FOSSIL WING OF A DRAGONFLY, FROM THE BOURNEMOUTH LEAF BEDS.

By H. Goss, F.L.S., F.G.S.



Right fore wing of a Species of *Libellulidæ*.

THAT insects made their appearance at a comparatively early period of the world's history is proved by the vast antiquity of the oldest geological formations in which their remains have been discovered; and the researches of the geologist and palæontologist have furnished conclusive evidence that ages before the existing families of the Vertebrata had come into being most of the family types of the Insecta were abundantly represented, and had obtained a wide geographical distribution.

It may, at first sight, seem almost incredible that the remains of any animals of so delicate and fragile a nature as insects could be preserved for centuries in a sufficiently perfect state as to be recognisable at the present day. Not only, however, have the wings and wing-cases of thousands of insects been discovered in such a state of preservation as to admit of their identification with those of existing orders,

families, and genera, but in many instances—from the nature of the matrix in which they have been embedded, or the circumstances under which their deposition and petrification took place—they have been so perfectly preserved as to enable an entomologist to pronounce with some degree of certainty as to the species to which they belonged.

The Coleoptera are, of course, from their nature, much more capable of resisting the effects of air and water than insects of other classes; but even the delicate wings of Neuroptera, Hymenoptera, and Diptera, are sometimes preserved in great perfection. From the fragmentary and imperfect state, however, of many fossil insects, it is evident that they have not all been embedded under similar conditions, or under circumstances equally favourable to their preservation; and numbers have, prior to their deposition and subsequent petrification, apparently been blown about by winds, or remained for years soddening in water. That insects are capable of resisting for a lengthened period the effects of air and water has been proved by actual experiment; and Dr. Hagen states that he has kept the wings of dragonflies in water for years without observing the slightest change in their texture.

In the course of last year and the year before last, Mr. John Starkie Gardner, F.G.S., who is studying the fossil flora of the Bournemouth leaf beds, belonging to the Bagshot Sands (Middle Eocene), discovered numerous fossil insects in these beds, associated with the plant remains which were the especial objects of his search. These insects, which Mr. Gardner has been good enough to lend me for examination, are principally Coleoptera (*Curculionidæ*, *Buprestidæ*, &c.) and Neuroptera. Amongst the remains of the last-named order, the best preserved and most interesting specimen is the right fore wing (figured above) of a species of *Libellulidæ*. On first examining this fossil I was doubtful whether to refer it to the genus *Libellula* or the genus *Æschna*; but Mr. C. O. Waterhouse, after carefully examining it and comparing it with specimens of existing species of *Libellulidæ* in the collection of the British Museum, decided that it belonged to the genus last named (*Æschna*). It will be seen from the figure that the wing is in a very fine state of preservation, its delicate reticulation being as perfect as that of a living dragonfly.

The species to which this dragonfly belonged has doubtless been long extinct; and its nearest living allies would probably

be found in tropical or subtropical countries, the climate of which more resembles that prevailing in this country at the period when this insect existed. That a much warmer climate then prevailed in this country than is at present enjoyed is evident from the plant remains of these leaf beds, which, according to Lyell, "remind the botanist of the types of tropical India and Australia."

The Avenue, Surbiton Hill.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. X. NYMPHALIDÆ—NYMPHALINÆ. Genera allied to VANESSA.

THE first genus, *Araschnia*, contains the smallest European species of the group, *A. Levana*, Linn., remarkable for the dissimilarity of its broods. It is popularly called the "Map" in France and Germany, perhaps on account of the sharpness of its markings. One or two other species have been described from North-eastern Asia, but are perhaps not truly distinct.

The next group, *Symbrenthia*, is East Indian, and includes a few black species, banded with rich tawny. The fore wings are marked with a band in the cell, and a short oblique one across the tip; and the hind wings (which are angulated, and have a strong projection in the middle) have two bands, the uppermost continued across the hinder angle of the fore wings. *S. Hypoclus* has a tawny under side, with a reddish brown oblique stripe running from the middle of the inner margin of the hind wings towards the hind margin of the fore wings; towards the tail it is dusted with pinkish gray and greenish. *S. Hypselis* is of a richer tawny above, and pale yellow, more or less varied with orange, and reticulated with black below; towards the hind margin there is a row of large black conical spots, bordered with yellow and black, and dusted with metallic-green. The species expand nearly two inches.

The genus *Hypanartia* is South American or African, and the species expand about two or two and a half inches; the fore wings are generally slightly truncated at the tips, and sometimes concave below; and the hind wings are produced into a short tail. Several species, such as *Lethe*, *Godmani*,

and *Zabulina*, are tawny or fulvous, with the tip of the fore wings broadly black; in *Lethe* the tip is spotted with fulvous, and in the others with white; but the fulvous portion of the fore wing is divided by an oblique black band in *Zabulina*, which is not the case in *Godmani*. *H. Kefersteini* is dull reddish instead of fulvous, with white spots on the black tip; and *H. Dione* is dull yellowish brown, with transverse black stripes, and a small, oblong, transparent spot in the middle of the fore wings, and one or two transparent dots nearer the tip; on the hind wings there are one or two black spots, scaled with blue towards the hind margin. *H. Hippomene*, from Natal and Madagascar, exactly resembles a small orange-banded *Pyrameis Atalanta*, with tails.

The species of the first section of *Vanessa* (*Grapta*) are most numerous and varied in North America, where the larger species, such as *Interrogationis*, expand nearly three inches. The Japanese *V. C-aureum* has the inner of two marginal dark bands on the hind wings dusted with blue. The typical section of *Vanessa* is common in Europe, Asia, and North America, but is not numerous in species, and most of them closely resemble our own *Urticæ* and *Polychloros*; but the Mexican *Cyanomelus* is wholly bluish green; the East Indian *Charonia* is greenish black, with a broad greenish blue submarginal band on all the wings; the Japanese *V. No-Japonicum* resembles this, but the band is narrower and bluer, and there is a large white spot on the costa of the fore wings, followed by a small one nearer the tip. The North American *V. Milberti* resembles *V. Urticæ*, but has only a submarginal tawny band on all the wings, which is bifurcated on the costa of the fore wings; the latter are also marked with two reddish spots in the cell.

The genus *Pyrameis* is also represented in all parts of the world, but by very few species, most of which resemble our own common European species. All the American species (*Atalanta* excepted) closely resemble our own *Cardui*, from which the common North American *P. Virginiensis*, Drury (= *Huntera*, Fabr.), may be distinguished by the under side of the hind wings, which is reticulated with yellowish, and marked with two large eyes only. *P. Caryl*, which is common throughout Western America, more resembles *Cardui*, but is smaller, with fewer black spots towards the tip of the fore wings. The Royal Dublin Society has a specimen of *Caryl*, marked "China;" which is probably an error. I record it, however, as the occurrence of

this species in China is not impossible, and, if confirmed, would be a matter of some interest. The Brazilian *P. Myrinna* resembles *P. Virginiensis*, but is much more richly coloured, and the space occupied by the submarginal eyes on the upper surface of the hind wings is filled up by a broad brown band. Of the species allied to *Atalanta* the most interesting are *Indica*, Herbst. (*Callirhoe*, Hübn.), from the East Indies and Canaries, which resembles a pale *Atalanta*, with a broad tawny band on the fore wings, marked with three black spots on the inside; *P. Gonerilla*, from New Zealand, which has a broad red band on the hind wings, marked with four black eyes with blue pupils; and *P. Tammeumea*, Esch., a large and richly-coloured species from the Sandwich Islands. *P. Itea* is reddish or greenish tawny at the base of the fore wings and on the hind wings, except at the costa and hind margin; the basal colouring of the fore wings is bounded by a very large, oval, yellow spot; the rest of the wing is black, with some small white and yellow spots near the tip: it is an Australian insect, and resembles no other species.

I have not been able to complete the subject of the genera allied to *Vanessa* in the present paper, and shall have to resume it in the next.

NOTE ON CERTAIN INSECTIVOROUS PLANTS.

By G. B. CORBIN.

It is well known that the above subject has excited some considerable degree of interest within the past few years, and especially since the publication of Mr. Darwin's book treating of the subject. Few readers of the 'Entomologist,' especially those who have visited the New Forest, are unacquainted with the insectivorous properties of the sundews (*Droseraceæ*), and the tenacity with which the viscous matter exuding from the glandular hairs, with which the leaves are encircled, entrap and hold the unfortunate insect that comes within reach. These are not of the smaller kinds only, but sometimes—as my friend the Rev. H. M. Wilkinson informs me—insects as large as a dragonfly are caught, and their juices assimilated to the plant's well-being; or, again, the butterwort (*Pinguicula*) acts in a somewhat similar manner; whilst in the water the bladderworts (*Urtricularia*) have an equally wonderful property of entrapping small water-slugs and insects, and, as Mr. Darwin propounds, thrives upon such

fare. Certain it is that small creatures are often found inside the bladder-like processes with which the last-named wonderful class of plants are provided; but how much the presence of the insects in such a situation contributes to the plant's well-being I leave for others to judge. In the case of the sundews it is very evident that the plant absorbs or digests the softer portions of the imprisoned insect, as the dried and rejected skeletons may sometimes be found almost covering the leaves, and the so-called digestive properties of the plant may be proved by placing one insect within its grasp, and killing another insect of the same species and placing it out of reach on some object near. It will be seen that the insect upon the sundew is skeletonised and sucked dry in a comparatively short space of time, whilst the other dries in the same manner as our cabinet specimens. In the instances above cited the insects seem to have been the unwilling prisoners of the plants retaining them; but other instances have come under my observation where the insects appear to have voluntarily settled upon the plant and died.

A few years ago I saw a plant in the New Forest, some species of dead nettle, with many insects attached to its leaves; and last year, in Devonshire, I saw a somewhat similar occurrence, only that the plant was, I believe, akin to the mullein. The leaves of the plants in both cases were beset with vegetable hairs, and the insects might have been partly detained by them, but they were as perfect as any in our cabinets. But the most remarkable instance, which induced me to begin this note, came under my observation last July, as follows;—I was strolling in the meadows by a broad ditch where an abundance of plants common to such situations were growing, as figwort (*Scrophularia*), hemp agrimony (*Eupatorium*), mugwort (*Artemisia*), &c., and my notice was attracted to the number of flies that were settled upon the last-named plants; and on making a closer inspection I was much surprised to find most of the insects were dead. These were attached to the plants in various situations, but in many, if not in all, cases the insect seemed to have settled thereon from choice; some had clasped the points of the leaf, whilst others seemed to hold the smaller stems of the branch in their embrace. Many of the insects were quite perfect, but others were broken from the motion of the plants caused by the wind. At first I thought the smell of the plant had attracted and killed them; but has it ever been proved that this plant is in any way poisonous to

insect life? The most remarkable part of this case is that the insects were to be seen only upon the mugwort, and this only for about five or six yards in extent, whilst other plants growing in the vicinity were free from them. It is true I saw a few scattered individuals upon plants of mugwort outside this "charmed circle," but within the space above indicated I saw thousands of defunct Diptera and other insects. I picked some portions of the plants, and showed them whilst fresh to Mr. Wilkinson, who, no doubt, can vouch for the correctness of what I describe. It must be understood that the insects I saw had not died from the attack of a fungoid growth such as we sometimes see, but they appeared to be quite fresh, and for the most part perfect. Has any other similar occurrence come under the notice of other readers of the 'Entomologist,' and if it has, what cause, or combination of causes, was supposed to have led to such an effect? I may mention that the majority of the insects I saw belonged to the yellowish brown looking creature (*Scatophaga stercoraria*) so commonly found on cow-droppings, and the like; but this to me was not so very peculiar, since the insect must be as common, or even commoner, than any other in a locality where cattle were continually grazing.

Further notes on this subject from other localities would, I am sure, be interesting to others as well as myself.

Ringwood.

MICRO-LEPIDOPTERA BRED, 1877 AND 1878.

By J. H. THRELFALL.

THE larvæ of *Gelechia viscariella* were very abundant in the tops of a *Lychnis* at Wyre, and in various localities near Preston, during April and May, 1877; but this year they are almost entirely absent; and, strange to say, the plant itself is very scarce where last year it abounded. The perfect insects emerged in limited numbers during July, the pupæ being very much infested with ichneumons.

On May 13th, 1877, I collected roots of sea plantain on the banks of the Wyre for larvæ of *Gelechia instabilella*, which mine in the roots, and, as far as present observation goes, not in the leaf or stem. From these emerged a dozen imagos of *G. instabilella* about the middle of July; and to my surprise, on June 30th, one specimen of a little *Gelechia*, unknown to me, and which Mr. Stainton pronounces to be

probably *G. immaculatella*. Larvæ found mining in the leaves of *Aster tripolium*, and supposed to be the same insect, turned out to be *Gelechia ocellatella*; thus giving another food-plant, and even manner of feeding, to this insect.

At Morecambe, on the cliffs, where *Genista tinctoria* grows, larvæ of *Anarsia genistella* were feeding in the shoots; but this insect appears so like the common form, *A. spartiella*, that I am inclined to refer the difference in size and colour to the more succulent properties of the food-plant, just as *Depressaria costosella* is more deeply marked with reddish under the same conditions. The larva was not compared with that of *A. spartiella*, nor indeed examined with the care due to it. On the same day and at the same place (June 8th) *Plutella annulatella* in the larval state were common in *Cochlearia anglica*: they emerged in the middle of July.

At the latter end of May, whilst collecting larvæ of *Coleophora* on the willows, at Farington, my attention was directed to the twisted condition of the shoots of *Lotus corniculatus*, on the railway bank close by. Thinking this was owing to larvæ of some *Sciaphila* I neglected to gather many at the time; but afterwards looking in the tin in which they were placed I perceived a *Gelechia* larva belonging to the *Taniolella* group, but darker. At the latter end of June one imago of a *Gelechia*, unknown to me, appeared above the rubbish; and on reference to Mr. Stainton he pronounced it to be probably an European species, *G. cincticulella*, which feeds on the Continent on *Genista*. I visited the locality this year, but only obtained one larva, which, unfortunately, died.

Larvæ of *Coleophora Wilkinsonella* began to feed on birch, at Witherslack, about the beginning of July, and continued to do so, at intervals only, until September, when they hibernate full fed, and, if brought into the house early in the spring, they will walk about, as if seeking for food. They, however, will not feed, but change into pupæ, and emerge about the middle of June. This is a similar habit to *C. limosipennella*, which with us never emerges in autumn, but feeds on through the autumn, hibernates, and emerges a little later in the year than *C. Wilkinsonella*. It also feeds on birch.

After very patient and repeated search at length larvæ of *Depressaria capreolella* were discovered feeding on leaves of *Pimpinella saxifraga*,—not on the radical leaves, however,

but on the higher shoot. They are deep green, with black heads; and, through the plant being buried amongst larger herbage, are very difficult to find. A few perfect insects emerged early in August. They feed during the first and second week in July.

In July, 1877 and 1878, I first had the pleasure of finding cones of *Gracilaria populetorum* on birch. At the former date one insect was bred from a miscellaneous collection of buds, mined leaves, &c.; but this year, by observing the different modes of feeding adopted by the larvæ on the birches, I succeeded in taking about three dozen cones, which occupy an entire leaf, and inside which a green, rather transparent larva was feeding. These larvæ changed to very long, taper, light green pupæ, from which emerged, in all, only five imagos of *G. populetorum*, and about eighteen or twenty large ichneumons. This accounts for the comparative rarity of the insect.

Some years ago Mr. Hodgkinson bred a few *Asycha profugellæ* from seeds of gentian; and, as he had afterwards failed in another attempt, I tried other seeds, such as *Pimpinella saxifraga*, wild carrot, &c. On September 29th these were placed in a flower-pot, and exposed all winter; and to my satisfaction, between July 1st and 30th about two dozen imagos appeared, in company with the Tortrix, *Semasia rufillana*, and *Ecophora flavimaculella*.

Preston, August, 1878.

ACORN- AND BUD-GALLS OF QUERCUS CERRIS.

By E. A. ORMEROD, F.M.S.

IN the 'Entomologist' (Entom. x. 42) I drew attention to some specimens of a minute bud-gall found in the previous year on the "Turkey oak" (*Quercus cerris*), and its variety the "Lucombe oak," at Kew: few in number and then deserted, but of some interest to record as soon as secured, as being the first-known instance of Cynipideous gall attack to this species of oak in Britain. Since then, in the spring of 1877, I found a few specimens of the gall with the insect developing; but it was not till May 3rd of the present year that I was able to secure sufficient specimens of the gall, with the contained gall-maker, as to show it to be an *Andricus*, but apparently of a species hitherto undescribed.

The five specimens still in my possession all turn out on examination to be males. These are approximately one-sixteenth of an inch in length; head, body, and abdomen dark brown; tibia and tarsi yellowish brown, with femora of the two hinder pair of legs of a darker colour, and the antennæ of a full brown, darker towards the apex; wings colourless throughout, with slightly tinted brown nervures.

The figure given (*Entom.* x. 43) represents the gall in the most perfect state as then found, free from the protecting processes which had gradually fallen. Fig. 1 now gives a



magnified view of the gall cluster in its healthiest and most vigorous form amongst the scales, young leaves, stipules, and stipule-like processes in the axils of the successive leaves along the shoot; these clusters usually consisting of about three galls placed separately, but occasionally adnate to each other; ovate-obtuse in shape, but somewhat flattened on one side; the wall of the single-chambered cell flexible and flocculent outside: when examined under a moderately powerful magnifier the galls may be found (as in the figure) placed at intervals along an abortive stalk, each with one or more stipule-like process at its base.

The appearance of this gall has hitherto been entirely limited to one tree of Turkey oak, and a very few specimens (found in 1876) on a Locombe oak, also at Kew; and it is somewhat singular that acorn-galls, of which figures are given (figs. 2, 3), should occur on these two individual trees, and, as far as has at present been observed, on no others.

The acorn-galls of the two trees differ slightly in the individual cells of the aggregate gall, being rather more numerous and more irregularly placed in that of the Turkey oak than of its sub-variety; but I do not see any essential difference between them. In each instance the gall-mass occupies the whole of the inside of the stunted acorn, and is formed of an aggregation of cells, occasionally separable, but more commonly firmly grown together, this mass being brown outside from the adherence of the outer pellicle of the acorn, and either smooth or irregularly lobed, or with regular lobes running from end to end, according to the more or less regular disposition of the cells. These cells are single chambered, with hard woody walls, and smooth light-coloured interior.

On February 18th I found a few of these gall-deformed acorns, which had fallen from their shells, and had the cells empty and apparently recently perforated, beneath one of the old trees of *Quercus cerris*, at Kew; one specimen, with undeveloped larvæ in the cells, alone remaining in its acorn-shell and cup. The galls in this case were all about a quarter of an inch or more in diameter, formed of from about seven to ten cells; each cell oval in shape, where the pressure of the surrounding mass allowed it characteristic development, but frequently compressed, so as merely to show its rounded extremity. In the most perfect form the cell appeared suddenly flattened towards one extremity, and at the other frequently marked by an oval depression (sketched, magnified, see fig. 2, 3) extending about half across it, surrounding a slightly raised convex spot,—a peculiar marking I have not noticed in other galls. The exterior of the cells, where exposed, is shaggy, and sometimes marked by irregular striæ; and the aggregate mass much resembles in its irregularly lobed form a miniature raspberry.

In the case of the Lucombe oak the galls were rather smaller, so as to be entirely included in the acorn-cup, which is abnormally contracted into a globular form, closed at the top; the gall also is composed of rather fewer cells, and these are occasionally separable, and somewhat more symmetrically arranged, and occasionally with the peculiar depressed mark. In other respects, both of form and colour, shagginess of exposed surface, and crisp woody walls to the single-chambered cells, the galls exactly correspond, and appear to me the work of one gall-maker. The very great number of gall-diseased acorns on this tree was also observable,

as from the beginning of October of last year till the middle of December the ground was well strewn with the fallen crop, and every acorn examined invariably showed gall presence, and commonly contained larvæ,—white, thick, and fleshy,—but which, though apparently perfectly healthy and filling their cells, still (on July 11th) gave no sign of passing into a state of pupation.

The galls correspond in so many points with the description of those of *Andricus glandium*, given by Mayr (translated on the opposite page), that I conjecture them to be similar, and the greater distortion of the acorn in the specimens before me merely to be the result of the whole of the interior of the acorn being occupied by the gall-cells, instead of only a portion (as in his figured specimen); and the larvæ also coincide with those mentioned in the long period elapsing before development.

It is remarkable that the acorn and the bud-galls should both occur, as far as at present seen, on these two trees, and no other, and the departure of the insect from the acorn-gall (in the case of some specimens on the *Quercus cerris*) having taken place apparently just before the time when the eggs for the bud-galls would (conjecturally) be deposited, suggests whether further search may not give an instance of the alternations, now considered proved by various observers.

I should add that since writing the above I am indebted to Herr von Schlechtendal (to whom I had forwarded specimens) for his opinion that the bud-gall corresponds with that of *Andricus circulans* of Mayr.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Continued from p. 183.)

91. *Spathogaster glandiformis*, Giraud.—This gall appears at the beginning of May on the fertile flowers of the Turkey oak. In the early stage it greatly resembles a normal fruit bloom, and it is almost impossible to recognise it. By the middle of May it becomes more or less rosy, and soon begins to get much larger than the ordinary fruit; gradually the galls swell to the size of a pea, or even a hazel nut; the

linear apical leaves lengthen, and mostly grow uniformly from the whole exterior of the nearly globular gall. It seldom remains quite green; the apical leaves generally redden, or the whole gall becomes reddish in colour. The style, with its accompanying depression, is always recognisable, even when it does not appear set on opposite the footstalk. In section it shows that the involucre, as well as the lower part of the germen, is enclosed in a green, soft merenchyma, which contains several larva chambers. The fly appears at the end of May or beginning of June, although I once obtained them as early as May 19th.—G. L. MAYR.



Fig. 91.—Gall of *Spathegaster glandiformis*, and in section.

This inconspicuous and early Turkey oak gall is not likely to occur in Britain. *Synergus Thaumacera*, Dalm., *Ceroptres Cerri*, Mayr, and *Megastigmus dorsalis*, Fabr., were bred sparingly with the gall-maker in May or June of the first year.—E. A. FITCH.

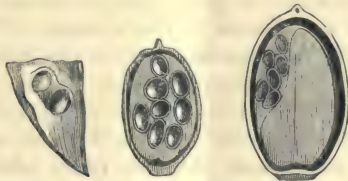


Fig. 92.—Sections of acorn, with galls of *Andricus glandium*.

92. *Andricus glandium*, Giraud.—If we cut through the fallen acorns of the Turkey oak in autumn we often find in their interior a remarkable thickening of the brown shell,

which takes the place of part of the nut, and in section show white, hard, oviform or polyhedral inner galls, of about the size of a hemp-seed. These are joined together with slightly denser tissue, and in each there lies a gall-fly larva. Sometimes we find the acorn-shell only thickened by a single gall at a place, but sometimes the seed is wholly appropriated, and the whole acorn filled with these galls. Herr von Haimhoffen first observed some females from three-year old galls. Of galls collected by me on September 28th, 1869, I have kept some quite dry, and others I have laid in water for a few hours from time to time: those which I collected early last autumn I have kept separate from those in sand, which is kept moist. From none of these galls have I yet obtained an insect, although in the greater part of them the larvæ are still living.—G. L. MAYR.

This acorn-gall has rather puzzled me for some time. It is doubtfully British. On October 26th, 1874, Mr. G. B. Rothera wrote me that he had found an acorn-gall at Ollerton (Nottinghamshire) on September 28th, 1873, as follows:—"My acorn-gall is certainly not that figured by Mayr, nor does it agree with the description given by Giraud, which applies to a multilocular gall. The one I found consisted of a thin, shelly, unilocular gall, lying loosely within the acorn case, and containing a large, fat, white, mandibulate larva, closely resembling that of *Cynips Kollari*. Unfortunately I damaged the larva in cutting open the gall, so that there is no chance of hatching the insect. If the larva had been a mere nomad, feeding upon the seed-lobes (cotyledons), these would have shown the usual division; instead of this, however, we had a perfectly closed chamber, with thin nut-like walls." In the early summer of 1875 Mr. Cameron collected two or three galls in the neighbourhood of Glasgow, which he referred to this species. These were from the common oak; and as the gall-maker has not been bred they cannot be referred with certainty to the *Quercus cerris* species. Mr. Cameron bred a specimen of *Synergus vulgaris* from one gall: this is given by Dr. Mayr as an inquiline in the galls of *A. glandium*. On the other hand, last autumn, guided by Miss Ormerod, I collected a quantity of the small acorns of *Quercus cerris* var. *Incombeana* from Kew Gardens, almost the whole of which were tenanted by larvæ: I at first thought these might be coleopterous *Balanini*. A description and note on these galls appears in the present issue (Entom. xi. 201): they somewhat differ from Mayr's figure, but like

the others are doubtfully referable to *A. glandium*. Dr. Giraud says the galls form a hard mass *between* the shell and the nut of the acorn. I may here state that in the autumn of 1875 I received, from the late Edward Newman, a curious, but true, gall, actually formed in a common nut (filbert). It was between the nut, with a very marked depression, and the shell near the base. I believe it came from Mr. Bond.—E. A. FITCH.



Fig. 93.—Galls of (?) *Cynips ramicola*.

93. *Cynips ramicola*, Schlechtendal.—On plate 7 of this work there is a typical specimen of this species, for which I am indebted to Herr von Schlechtendal. I considered it probable that these bark-galls were immature, and that they were the same as some which, in my collection, are mixed with galls of *Aphilothrix Sieboldi*. They occur on the same bough; and at plate 1, figure 5, are figured in the centre of the upright twig. [See Entom. vii. 52.]—G. L. MAYR.

After noticing the, to him unknown, ? *Cynips superfetationis*, the gall of which was described by Giraud as resembling a small acorn grafted on another, and occurring on *Quercus pubescens* and *Q. pedunculata*, Dr. Mayr, in an appendix, gives a little further information on one or two included species, and describes four others. The first, *C. ramicola*, belongs to the puzzling little group of bark-galls, which includes the single-celled form of *A. radialis*, *A. corticis*, *A. rhizomæ*, and *A. Sieboldi* (= *corticalis*); *Radialis* occurs in Britain commonly; *Sieboldi* is widely distributed, and not rare; whilst *Corticis* has lately been added to our fauna (Entom. x. 165). Dr. Adler attempted to show that *A. corticis* and *A. rhizomæ* were one species; but Dr. Mayr tells us that he only refers to two forms of *A. corticis*, and did not know the gall of *A. rhizomæ* at all.—E. A. FITCH.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTE ON THE MEADOW-BROWN (*SATYRUS JANIRA*).—This species having been extremely common here during the whole of July—four or five times more plentiful than the “whites,” taken collectively, at least in the earlier part of the month—I have observed a few points in its habits, which may be worth putting on record. It visits, as far as I have seen, exclusively hedgerow-flowers, such as the blackberry blossom, the wild roses (as long as they remained), the thistles, the privet, and a white umbelliferous flower very abundant along the hedges in this district. I have repeatedly observed one and the same specimen fly from a blackberry flower to a thistle, or *vice versâ*; but I never saw one of them visit red and white clover, even after sitting on the ground close to the plants. I have watched one fly across the corner of a potato field and repeatedly settle upon the leaves, but it never visited one of the flowers. This insect has some protective habits: when sitting upon a flower, or on the ground, with its wings closed, the under side of the anterior pair would be very conspicuous, on account of the eye-spot at the outer angle; it therefore very frequently lowers the anterior wings, so that they disappear between the posterior pair, and in this attitude it may well be taken, by man or bird, for a discoloured leaf; when sitting upon the ground, also, it very generally leans on one side, so that its closed and erected wings, instead of standing at right angles to the ground or other surface, “heel over” at a very acute angle. In this position the insect’s resemblance to a withered leaf is much increased. I have seen other butterflies assume this attitude, but none so generally. As might be expected the meadow-brown is very bold, hovering round, and even settling upon, persons who walk leisurely through its haunts; so it may easily be captured with the finger and thumb when at rest upon a leaf. Like most of its congeners it appears early in the morning, retires comparatively late in the evening, and is less apt to vanish on the approach of heavy clouds than the members of the genus *Vanessa*. It may be counted among the many species which will settle upon dung, recent or decayed, and imbibe its juices.—J. W. SLATER; 3, Bicester Road, Aylesbury.

NOTE ON *ARGYNNIS PAPHIA*.—On August 7th, in an enclosure in the New Forest, *Argynnis Paphia* was in abundance, but good specimens were hard to find, being so

late in the season. Observing two which looked good specimens flying about near one another I netted them, and found one was a female, evidently just emerged, and the other a male, in only fair condition. I killed the female, and let the male go. Noticing, however, that the male continued to fly round my head I held out the female in my hand: the circle of flight of the male became smaller and smaller; and at last the insect alighted on my hand, where it sat for some little time, until I moved off to show it to a friend who was with me. It then flew off, but again alighted; and we watched it on my hand for a minute or two. I then took it by the wings and threw it into the air. It flew overhead for a little time, but then seemed to have lost the attraction, and flew away. I may mention that at the same time and place I took one of the variety *Valezina*, and missed another; my friend also took one the next day.—[Rev.] W. W. FOWLER; Repton, Burton-on-Trent.

ON *HESPERIA ACTÆON*, &c.—This little butterfly has been very scarce this year, as well as all other insects; but last year it was in greater profusion than I have ever seen it. The first I captured was on June 20th, and the last on September 4th. It is more widely distributed than is commonly supposed, as I have taken it in various places on the Dorset coast, from Swanage to Preston Preventive Station, which is not far from Weymouth. At Portland I have taken only a couple of *Acidalia degeneraria*, three of *A. rusticata*, and three of *Eudorea phæoluca*, besides several of *Psylla artemisiæ*. These species are almost, if not entirely, confined to Dorsetshire, as far as the British Isles are concerned, with the exception perhaps of *A. rusticata*.—C. W. DALE; Glanville's Wootton, August 2, 1878.

VARIETY OF *LYCÆNA ALEXIS*.—Whilst collecting in the Isle of Wight I captured, on June 6th, an hermaphrodite specimen of *Lycæna Alexis*; the two wings on the left-hand side being the ordinary male type, whilst the right-hand side has the female markings clearly defined, the red marginal spots being very distinct. The female side of the specimen is smaller, and the wings are rounder than the male side. It was flying in a chalk-pit at Arreton, together with a great many common blues and heaths.—ARTHUR J. ROSE; Mutlah Lodge, College Avenue, Hackney, June 20, 1878.

LARVA OF *NOCTUA RHOMBOIDEA*.—As nearly three years have now elapsed since the autumn when I had the good luck to obtain eggs of this species (in that season one of the

lions of Lyndhurst), and as—though I have patiently waited for its advent—no description has emanated from the pen of those entomologists who usually describe larvæ, although the larva does not resemble the description given of it in Newman's 'British Moths,' I cannot but suppose that they have failed to obtain it, or that they have confounded it with that of *Noctua baja*, which it closely resembles. I therefore venture to offer to the readers of the 'Entomologist' the following notes. In the middle of August, 1874, having captured at sugar some worn females of this species, in Hurst Hill Enclosure, New Forest, I confined them, along with some twigs of bramble, in a handbox covered with leno-muslin, and they deposited eggs pretty freely, not on the plant, but in clusters on some projecting splinters of wood, and on the leno. The eggs were of the usual *Noctua* form, and pale lemon-yellow in colour, and hatched at the end of the month. The young larvæ at first resembled those of *N. festiva*, but after a moult they assumed a dull opaque tint, somewhat between olive and Prussian green, with the five lines tolerably well defined, paler than the ground colour, the spiracular especially conspicuous and whiter than the rest, its upper boundary defined by a thin dark line; their heads ochreous-brown. They fed at first on mint, but during the winter I supplied them with carrots; and the only three which I retained through hybernation attained a very large size, and buried by the end of the first week in February, 1875. The full-fed larva is one inch and four lines in length, at rest; one inch and nine lines when fully extended, when it appears rather more elongate and less dumpy than that of *N. baja*. It is plump, attenuated in front; the 12th segment tumid dorsally, and the segmental divisions tolerably deeply incised; the head and the usual trapezoidal and other dots each bearing slender whitish hairs. The head is sienna-brown reticulated with black, with two crescentic black marks (one on each side of the median suture) placed back to back, and having between them a pale line forked at its lower extremity. The plate on the 2nd segment is raw-sienna-brown, with the commencement of the dorsal line whitish, broad, and well marked; the subdorsal indistinct, or sometimes absent. The body is smooth and soft, and its colour is a mixture of different tints of brown and dirty ochreous, sometimes even (as in *N. baja*) approaching to a pale rose-madder, at other times of a more uniform dingy sepia or umber-brown, irrorated and reticulated with smoke-

colour. The whole surface has a peculiar streaky appearance caused by the greater boldness of the dusky reticulations, as compared with those in *N. baja*; these on the dorsal surface mass themselves into a series of lozenge-shaped marks, more or less distinct, each defined posteriorly by a slightly-darker V-shaped shade, the apex (except on the 12th segment, where the lozenge becomes a triangle) pointing backwards. On the 11th and 12th segments the V's are replaced by a pair of dark brown triangular marks. The medio-dorsal and subdorsal lines are ochreous and interrupted; the former passes through the centre of the dorsal lozenges and, in the centre of each segment after the 4th, through a pair of short, curved, ochreous marks, edged anteriorly with smoke-colour: these marks are nearly erased in the dark specimens, but conspicuous in the paler ones. The subdorsal lines are somewhat dilated on the posterior edge of the hinder segments, and are united at the hinder edge of the 12th segment by a transverse ochreous band. There is a slender, whitish, spiracular line sharply defined along its upper edge by a broad dark shade, scalloped above the convexities of the scallops upwards, and followed below by a broad band, grayish or reddish ochreous, mixed with dirty whitish. There is behind each spiracle an oval, dark brown blotch, and a distinct black dot just above the spiracular line in the centre of the 3rd and 4th segments. The ventral surface and claspers are grayish ochreous, slightly tinged with the prevailing ground colour; the legs ochreous-brown. Spiracles (in the paler larvæ) ochreous, in a delicate black ring; in the darker larvæ dark brown, in an ochreous ring. Usual spots ochreous, each accompanied by a dark brown dot. I may mention that in the bright-coloured varieties of *N. baja* (I have had them of a deep orange) the subdorsal lines are canary-yellow; in the same varieties of *N. rhomboidea* they are of the usual dull ochreous.—BERNARD LOCKYER; 27, King Street, Covent Garden, London.

ACHERONTIA ATROPOS AND ACRONYCTA ALNI.—I have obtained, since July 30th, about a dozen larvæ of *Acherontia Atropos* found feeding on *Lycium barbarum* (tea tree); also upon privet: two were the dark brown variety. On August 12th my wife found a larva of *Acronycta alni*, at rest, on dog-rose; it has since fed up upon pear leaves, and is now a pupa; it spun up amongst the loose leaves. One I got last season produced a fine female specimen on the 27th of last May.—G. BAKER; Ashby Road, Burton-on-Trent.

ACRONYCTA ALNI.—A friend brought a fine full-fed larva of this moth to me recently. He found it feeding upon a lime tree, in Eserick Park, on July 25th.—T. FOSTER; 6, Wren Lane, Selby, Yorks, August 5, 1878.

ZYGÆNA FILIPENDULÆ.—Out of about a score of chrysalids one emerged in July with the spots and under wings a beautiful pale yellow.—E. D. FISH; Higher Tranmere, Birkenhead.

ON THE DISAPPEARANCE OF ORGYIA CÆNOSA FROM WICKEN FEN.—Sixteen years ago this species was in the greatest abundance in the larva, pupa, and imago states, at the same time: I found them all over the fen. I have visited the fen several times in different years since, and they have been getting scarcer every time. The fen men have not now seen the larvæ for three or four years; but I have known the time they used to find them by hundreds. The last that I can hear of this species being taken was about three or four years ago, by Mr. Wheeler, at light: there have been none seen since. In 1875 and 1876 the whole fen was covered with water, and it is probable that the hybernating larvæ were drowned: the fen was covered with water for over a month at the time. I have never found this species in any of the Norfolk or Suffolk fens, and am afraid it will soon become, like *Liparis dispar*, a thing of the past in this country.—T. EEDLE; 40, Goldsmith Row, Hackney Road.

EUPÆCILIA GEYERIANA AND GELECHIA PALUSTRELLA.—During a short stay in the Norfolk fens last month I secured a fine series of *Eupæcilia Geyeriana*: they fly just before dusk, and are very active on the wing. I also took four examples of *Gelechia palustrella*: these came to the light-house, which I carry in the boat, at about one o'clock in the morning.—E. G. MEER; 56, Brompton Road, August 2, 1878.

CLOTHES-MOTHS: LIFE-HISTORY, AND HOW TO DESTROY THEM.—The name clothes-moths is applied to several distinct, but similar, species of minute moths belonging to the family Tineidæ, which, in their larval state, are very destructive to woollen goods, fur, skins, feathers, and similar substances. Among them may be mentioned the clothes-moth (*Tinea vestianella*), the carpet-moth (*Tinea tapetzella*), the fur-moth (*Tinea pellionella*), and the hair-moth (*Tinea crinella*). These Tineidæ have slender bodies, and lanceolate deeply-fringed wings that expand six-tenths or eight-tenths of an inch. The antennæ and palpi

are short and thread-like, and there is a thick orange or brown tuft on the forehead. The colours range from buff to drab and dark gray. The eggs are laid in May and June (the moth dying immediately afterwards), and hatch out in fifteen days. The young worms at once proceed to work, gnawing the substances within their reach, and covering themselves with the fragments, which they shape into hollow rolls and line with silk. These rolls are by some carried on their backs as they move along, and by others fastened to the substance they are feeding upon, and they are enlarged from time to time by additions to the open extremities, and by portions let into the sides, which are split open for this purpose. In such ambush the worms carry on their work of destruction through the summer, rest in seeming torpor during the winter, and change to chrysalids early in the spring. They transform again in twenty days, and issue from their shelter as winged moths, to fly about in the evening till they have paired, and are ready to lay eggs. Then follows an invasion of dark closets, chests, and drawers, edges of carpets, folds of curtains, and hanging garments; and the foundation of a new colony is swiftly laid. The early days of June should herald vigorous and exterminating warfare against these subtle pests. Closets, wardrobes, all receptacles for clothing, should be emptied and laid open, their contents thoroughly exposed to light and air, and well brushed and shaken before being replaced. In old houses, much infested with moths, all cracks in floors, wainscots, shelves, or furniture, should be brushed over with spirits of turpentine. Camphor or tobacco should be placed among all garments, furs, plumes, &c., when laid aside for the summer. To secure cloth linings of carriages from the attacks of moths sponge them on both sides with a solution of corrosive sublimate of mercury in alcohol, made just strong enough not to leave a white mark on a black feather. Moths may be killed by fumigating the article containing them with tobacco or sulphur, or by putting it, if practicable, into an oven heated to about 150° Fah.—C. V. RILEY. [Extracted.]

[*T. vestianella*, Steph., is a synonym of *Tinea* (*Blabophanes*) *rusticella*, Hb.; and *T. crinella*, Tr., of *Tinea* (*Tineola*) *biselliella*, Hummel.—ED.]

“A HUNTING WASP.—The following interesting account of a chase between a wasp and a spider has been forwarded to ‘Nature,’ July, 1878, by Mr. Henry Cecil, who wrote to ‘Nature’ on the subject (vol. xvii. p. 381):—

"The Piræus, Athens, June 19.

"Dear Sir,—Your letter of April 5th, and the two numbers of 'Nature,' reached this during my absence in Thessaly, which must be my apology for not having sooner replied to your letter. Though more than thirty years have elapsed since the circumstance alluded to, I perfectly remember the curious chase I witnessed of a very large and powerful hunting-spider by a species of wasp. I was sitting one summer's afternoon at an open window (my bed-room) looking into a garden, when I was surprised to observe a large and rare species of spider run across the window-sill in a crouching attitude. It struck me the spider was evidently alarmed, or it would not have so fearlessly approached me. It hastened to conceal itself under the projecting edge of the window-sill inside the room, and had hardly done so when a very fine large hunting-wasp buzzed in at the open window and flew about the room, evidently in search of something. Finding nothing the wasp returned to the open window and settled on the window-sill, running backwards and forwards as a dog does when looking or searching for a lost scent. It soon alighted on the track of the poor spider, and in a moment it discovered its hiding-place, darted down on it, and no doubt inflicted a wound with its sting. The spider rushed off again, and this time took refuge under the bed, trying to conceal itself under the framework or planks which supported the mattress. The same scene occurred here; the wasp never appeared to follow the spider by sight, but ran backwards and forward in large circles like a hound. The moment the trail of the spider was found the wasp followed all the turns it had made, till it came on it again. The poor spider was chased from hiding-place to hiding-place—out of the bed-room, across a passage, and into the middle of another large room, where it finally succumbed to the repeated stings inflicted by the wasp. Rolling itself up into a ball the wasp then took possession of its prey, and, after ascertaining it could make no resistance, tucked it up under its very long hind legs, just as a hawk or an eagle carries off its quarry, and was flying off to its nest, when I interposed, and secured both for my collection. Both insects were rare ones; and during the ten years I collected as a field naturalist in Greece I don't remember ever seeing more than three or four specimens of either that species of wasp or spider. The wasp was a hunting one (a female), about an inch and a half long; a very finely formed insect, which for gracefulness of form

and beauty of colouring is entitled to be placed at the head of its species.* The legs of this kind of wasp are very long, and of a dark chocolate-brown; it runs very quickly. The wings are a light brown with dark brown tips, and long and powerful; and the body beautifully mottled with pale yellow and brown. It has very long, fine antennæ. It is not an English species; but probably exists in Spain, the south of France, and Italy. The spider, too, was a rare one: one of the largest Greek hunting-spiders, nearly as large in the spread of its legs as the flesh-coloured tarantula, though without his powerful crab-like pincers. The one I allude to must have covered at least three inches in circumference when its legs were fully extended. It was of a dull mottled brown colour on the upper surface of the body; very difficult to distinguish from the ground. The lower part of its body was, however, brilliantly coloured, the long legs, or arms, being marked underneath with velvet-like-looking black and white rings. The head, thorax, and abdomen, were of a velvety black, the lower portion of the latter surrounded with a bright orange ring. There is only one error in the account given by you in 'Nature,' that is that you were under the impression I told you that kind of spider was the common prey of that species of wasp. You must have misunderstood me. (1.) I do not think that particular kind of spider is sufficiently common for this to be the case. (2.) I never saw a similar conflict of the kind before or after, which, as it was in a room, and not in the grass, where I presume such encounters usually take place, I observed under exceptionally favourable circumstances. I am certain the spider left no web or thread behind it. I cannot be sure, however, that, as it had evidently been attacked by the wasp before entering my room, a small quantity of liquid may not have exuded from its wounds, which may have helped the wasp in tracking it. I have no doubt myself that insects have the sense of smell, and probably much more developed than our own. No one, as you remark, who has sugared for moths, or seen the large *Sphingidæ* hovering over the strongest-scented flower at night, or employed a caged female moth as a lure to her male admirers, can, I think, doubt this. If so, let them put a saucerful of honey in a corner of a room opening into a garden, throw open the window, and see how soon the bees, wasps, &c., will be attracted to the honey. There is a

* The hunting-wasp was, no doubt, a species of the genus *Pompilus*.—
F. SMITH.

tradition in the East that one of the tests by which the queen of Sheba tried to prove the wisdom of Solomon, was placing on a table before him two bouquets, one of artificial, and the other of natural, flowers, and requiring that he should say which were the real and which the artificial, without moving from his throne. Solomon ordered the windows to be thrown open, and in flew the bees, &c., which went at once to the real flowers. Whether the senses of insects, birds, and what we call the lower creation, are similar to ours in every respect, it is very difficult to say. No doubt a dog, if he could speak, would say a man had not the sense of smell, and would prove that his nose was worse than useless to him. An eagle or hawk would say that men and moles, &c., have only the rudiments of eyes; and so on. Man, with five very imperfectly developed senses (who can say that there are not twenty senses), is the only animal that is dogmatical, and denies all he cannot understand. The oracle of Delphi said 'Socrates was the wisest man in Greece, because he was the only man who knew he knew nothing.'—Yours faithfully, C. L. W. MERLIN.

"To Henry Cecil, Esq., Bournemouth."

PRESERVATION OF EPPING FOREST.—The Epping Forest bill received the royal assent on the 8th August last; and from that day, after a twenty-five years' struggle, a tract of close upon six thousand acres of virgin forest will be preserved for public use. By its provisions what remains of the Forest will be vested in the Corporation of London, for ever, for the use of the commoners and the recreation of the public: thus one of the "happy hunting-grounds" of the metropolitan entomologist is still likely to retain many of its treasures. Its rich insect fauna is constantly referred to throughout our own ten volumes. London naturalists certainly must be congratulated on their city standing alone amongst the European capitals as possessing a virgin forest actually touching its borders (at Stratford). The whole county of Essex was originally one vast forest. Kings Stephen and John were the first to commence its disafforestation, which has gradually been going on to the present day. It is to be hoped that this is now effectually stopped; and that Loughton or Waltham will long continue a favourite resort, not only for the mere holiday-maker and lover of Nature, but for the scientific naturalist.—E. A. F.

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NOTES ON PSYLLIODES CHRYSOCEPHALA.

By E. A. ORMEROD, F.M.S.

Fig. 1.



PSYLLIODES CHRYSOCEPHALA.

ABOUT March 18th of the present year, whilst examining a bed of white turnips running up into flowering stems in my garden, near Isleworth, I noticed that many of the shoots were channelled internally by small grubs. In some cases these galleries appeared only just begun, and were still only horizontal piercings at distances along the stem, with the larvæ occupying more than half the length of the tunnel, but more frequently, judging by the discoloration and the progress of the injury, the work had been commenced some time before at the ground level, and had been carried thence some inches up the stem, occasionally diverging into the petiole of the leaf; and later on (as shown at fig. 1) the larval workings were to be found both in the centre and beneath the rind of the bulb itself.

The bed of turnips, as well as some others in the neigh-

bourhood, proved greatly infested. Of thirteen plants brought in for examination only one proved free from attack, but the larvæ were not numerous in each plant; sometimes as many as three or four were to be found at distances along the galleries; sometimes only a single specimen was discoverable. 2

The injury being new to me I isolated some of the attacked plants with the larvæ, which developed about the beginning of June into the well-known beetle *Psylliodes chrysocephala*, distinguishable from its near allies the turnip-flea beetles (*Phyllotretæ*), technically, by peculiarities of the antennæ and posterior tarsi, and to general observation by the rather larger size, more robust form, and even greater saltatory powers. As I am not aware that its life-history has been given in England, a short note may perhaps be of interest.

The larvæ varied in size when first seen from just over one-sixteenth of an inch in length to five-sixteenths, apparently the limit of growth, and were white or yellowish in colour, with dark brown mottled head and strongly-toothed jaws. The segments of the body slightly hairy, with transverse rows of minute pale tubercular spots, for the most part armed with a dark brown bristle, and having smaller and paler rows placed between them for a short distance from the caudal segment. The segment immediately behind the head is marked on the upper surface by two triangular patches formed of brown dots placed along the central white line, and by a curved line of dots running longitudinally along each side of the segment; between these and the central markings is an irregular pattern of dots, usually involving in it a V-shape, with the point turned to the central line, as given

Fig. 2.



at A, fig. 2. The upper surface of the caudal extremity is convex, pale brown, glistening, and horn-like, armed at the tip with two minute upturned triangular points, and marked by two pairs of rows of brown spots placed longitudinally, and usually with the inner line of each pair straight, the outer diverging, so as to follow the outline of the segment, fig. 2, B. The caudal foot was extremely strongly developed.

On May 21st the larvæ were passing into the pupal state in earth near the turnips, and, in all the specimens observed, lay either immediately beneath the surface or about half an inch beneath, but not in formed cells,—simply in earth, necessarily smoothed by the presence of the pupæ, which were placed indifferently in horizontal or vertical direction.

On May 28th the turnip stems appeared deserted by the larvæ, though a few might still be found unchanged in the earth with the pupæ. The pupæ were of a yellowish colour, about an eighth of an inch in length, and sprinkled with stout hairs, both in transverse lines on the segments and also on the back of the thorax. The shape narrowly oval, tapering gradually to the caudal extremity, and terminated in a somewhat lunate form by two appendages, consisting (as seen magnified) of a bulb narrowed suddenly into a prolonged cylindrical process curved inwards, and slightly tapering to its blunt extremity, the bristles with which the whole appendage is covered being arranged in longitudinal striæ along the bulb, and in successive sheathing rings gradually narrowing towards the extremity on the cylindrical prolongation, much resembling in miniature the sheathing of the flowering stems of some of the *Equisetæ*. Fig. 2, c, gives the appearance of the bulb magnified, and at its side a still more enlarged sketch of the sheaths of the cylindrical prolongation.

On June 3rd the pupæ nearest the surface of the soil had begun to change colour previous to complete development; and on the 21st the perfect beetles were to be found on the surface, the collections of isolated specimens which had been placed in the driest situations, showing the greatest number of beetles. All, with one exception, turned out typical specimens of *Psylliodes chrysocephala*, too well known to require description; the solitary exception, however, proving of some interest as a specimen of the *Psylliodes nigricollis*, considered sometimes rather a variety of the *P. chrysocephala* than a distinct species. The mere finding of this beetle with the others, without having especially observed the individual larva it proceeded from, of course leaves this question still open; but the plants infested with the larvæ having been selected and isolated with great care it points to a similarity in food, locality, and life-history.

Looked at economically the *Psylliodes* presence seems of little moment, except in the decay induced in the turnip

bulb, where several larvæ are present; but the vigour of the developed beetle, and great vital powers of the larvæ under injury, might make it an inconvenient guest; and its habits in its early stages lay it so thoroughly open to attack by burning infested bulbs, or throwing the ground open to be cleared by the birds, that its destruction where much present would be a task of little difficulty, and certainly desirable.

Isleworth, September 10, 1878.

DESCRIPTIONS OF OAK-GALLS.

Translated from Dr. G. L. MAYR's 'Die Mitteleuropäischen Eichengallen.'

By EDWARD A. FITCH.

(Concluded from p. 207.)



Fig. 94.—Galls of *Aphilothrix albopunctata*. a. Collected by myself; b. Schlechtendal's type; c. Schenck's type.

94. *Aphilothrix albopunctata*, Schlechtendal.—This gall is developed in April from the buds of the last year's twigs of *Quercus pubescens*, *Q. pedunculata*, and *Q. sessiliflora*. It is elongately oviform,—5 to 6·6 millimetres in length, and 3 to 4 millimetres in breadth,—smooth, green (later often yellowish brown), more or less covered with elliptical whitish spots placed lengthwise. It has at the apex a small (sometimes indistinct), brown, well-marked papilla, and is surrounded at the base with the bud-scales. In section the gall exhibits an outer, at first somewhat soft but quickly hardening, rind, which surrounds the moderately thick-walled, woody, inner gall, and is attached to it. The gall falls from the bud in the first fortnight of May; and according to Schlechtendal the gall-fly emerges at the end of November. As early as 1865 this gall was described by Professor Schenck, in his 'Beitr. z. Kenntniss d. nass. Cynip.' (p. 116); but he only bred *Synergi* from the galls

found by him. I found it myself in 1869 on April 15th; in the following year at the beginning of May; and also this year (1871) on *Q. pubescens* and *Q. sessiliflora*, but have not yet bred the gall-fly.—G. L. MAYR.

I first found the galls of this species in Essex, on July 3rd, 1874, but believe it to be widely distributed in Britain, as it occurs in Mr. P. Cameron's list of Sutherlandshire Hymenoptera. I have collected numerous specimens of these galls in the early summer of every year since, but, like Mayr, have not yet bred the gall-maker. Schlechtendal only bred a single specimen. The insects I have bred have been *Synergus facialis*, Hart., very abundantly in June and July; *S. radiatus*, Mayr, with *S. facialis*, but much more uncommon; *Eurytoma squamea*, Wlk., commonly; another species of *Eurytoma*; *Megastigmus dorsalis*, Fabr., rarely; two, if not three, species of *Pteromalus*; *Eupelmus urozonus*, Dlm., rarely in July; and two other species (one, commonly) of *Chalcididae*, which are unknown to me. Dr. Mayr says Herr Wachtl bred two specimens of *Olynx trilineata*, Mayr, from these galls, in February of the second year.—E. A. FITCH.

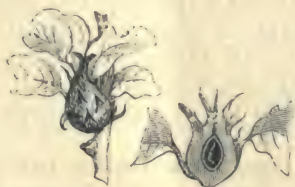


Fig. 95.—Galls of *Andricus singularis*, and in section.

95. *Andricus singularis*, Mayr.—In the early part of June, this year, I found this gall, for the first time, in the neighbourhood of Vienna. It is developed from an axillar, rarely from a terminal, bud of *Quercus cerris*, and consists of a green, more or less globular, swelling, which is thinly clothed with hairs, and is generally of about the size of a pea: from this two to four, but not more, very small rudimentary leaves are developed. If we cut through the gall in a perpendicular direction we see that it consists of a thick-walled cup, the small cavity of which contains a single brown, moderately hard, inner gall, of which the apex only is free above, whilst everywhere else it is enveloped in the green fleshy cup. In rare cases the small twigs continue to grow

from the margin of the cup, and bear leaves. From the collected galls the gall-flies appeared in the middle of June, and I found a gall as early as June 8th, which was already empty: it is, therefore, very possible that the usual flight time is still earlier, for the wet spring of this year retarded the appearance of gall-flies generally. *A. singularis* bites its exit-hole through the upper apical end of the inner gall, so that it is observable without separating the rudimentary leaves. Soon after the emergence of the gall-fly these leaves wither and become yellow, the globular gall shrivels considerably and falls; at least it has done so in many cases, according to my own observations. I at first took this gall for a very small variety of that of *Andricus cydonie*, to which it bears a great resemblance, yet it is separable from that species in that it is always much smaller, and because it always contains but a single central inner gall. A comparison of the imago of the two species leaves no doubt but that they are quite distinct. As may be seen in the figure of the new species the leaf rosette is more or less unconnected with the gall, still it must be placed amongst the bud-galls, for in this case the axis of the bud itself becomes centred in the inner gall. In anatomical structure this gall stands in nearest relationship to that of *Andricus inflator*, differing from it that the inner gall takes up the whole of the small cavity of the short cup, while in the gall of *A. inflator* the inner gall only lies at the end of the large canal-like cavity of the long cup.—G. L. MAYR.

This recently discovered Turkey oak species is hardly likely to occur in Britain. In addition to the gall-maker Dr. Mayr bred *Synergus thaumacera*, *Megastigmus dorsalis*, and *Syntomaspis cerri*, from these galls. This last new species of *Torymidæ* has only been bred from this and the *S. politus* gall; fourteen specimens were bred in March of the second year.—E. A. FITCH.

96. *Spathogaster Taschenbergi*, Schl.—The typical galls now before me agree both in form, size and structure with the gall of *Spathogaster flosculi*, Gir. (*Giraudi*, Tschek.), differing only in pubescence. In Schlechtendal's species the surface of the gall (in the dried state) is thickly covered with dark violet hairs, which stand out perpendicularly: they are straight, rather short, stiff and rather pointed at the ends; whilst in the gall of *S. flosculi* these (in the dried state) are yellowish green, reddish, or brownish yellow in colour, more or less curved, tolerably long, soft and shaggy; the galls are

also sometimes rather narrower in form, the stripes or bands appearing thinner (on account of the loss of sap in drying). In a letter to me Herr von Schlechtendal has corrected his former statement that the galls also appear on the young one-year old twigs. Since the galls of *S. Taschenbergi* and

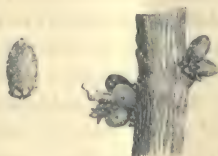


Fig. 96.—Galls of *Spathogaster Taschenbergi*; and magnified.

S. flosculi stand so very near one another, and the imagos of both species only differ in unimportant points, I can come to no other conclusion, from our present knowledge, than that they are both one species.—G. L. MAYR.

In May of last year Miss E. A. Ormerod and Mr. G. B. Rothera both sent me galls, which are doubtfully referable to this species. They were collected respectively from Sedbury Park (Gloucestershire) and from the neighbourhood of Nottingham. I have lately also received specimens of the gall from Mr. P. Cameron. As with several bud-galls, so here: it is likely there are two or three closely-allied species, which are not as yet distinctly defined.—E. A. FITCH.

These translations are at last completed. Commenced by Mrs. Hubert Herkomer (*née* Weise), with notes by the late Francis Walker and Edward Newman, and finished by myself, they have run through five volumes of the 'Entomologist.' This length has no doubt made them wearisome to many, but by some I am assured they have been appreciated; and no better starting-point can be taken, for a knowledge of the various galls, than Dr. Mayr's excellent figures and descriptions. The translation has been kept as literal as possible, and in my added notes I have endeavoured to collate what is already put on record respecting the various species. A knowledge of galls has been aimed at by many, but the difficulty of finding a foundation on which to build has deterred many workers. This is shown by the many enquiries that have reached me for books on the subject: of these there are none; gall literature is mostly scattered in various entomological serials. After the works of Malpighi,

DeGeer, Reaumur, Linné, Fabricius, &c., the most important memoirs are Hartig's, in Germar's 'Zeitschrift,' ii. 176—209 (1840), iii. 321—358 (1841), iv. 395—422 (1843); Giraud's, in 'Verhandlungen, z.-b. Gesellschaft, Wien.' ix. 337—374 (1859); Schenck's, in 'Beitr. z. Kenntniss. d. nass Cyn.' (1865); and Schlechtendal's, in the 'Stettiner Entomologische Zeitung,' xxxi. 338—347, 376—398 (1870); but very many smaller and scattered papers must be referred to. Those by Osten-Sacken, Walsh, and Bassett, in the first four volumes of the Proceedings of the Entomological Society of Philadelphia, are important. A series of papers on the British species, by the Rev. T. A. Marshall, appeared in Ent. Mo. Mag. (1867—8): in these fourteen oak species are described as British; we now know forty-one to be indigenous. This shows that good work has been done.

A general enquiry has been—how to distinguish the inquiline *Synergi* from the true gall-makers? This may be at first rather confusing; but perhaps the best general guide that can be given is the venation of the fore wings. The two



a, b, c. Areola radialis; c, d, e. Areola cubitalis secunda.

accompanying figures show the difference clearly. The gall-makers have the second cubital areola (c, d, e, in figure) at the base of the radial cell (a, c, b, in figure), whilst the *Synergi* have it near the middle. The first section—Hartig's "area radialis angusta, arcola basalis"—is represented by a wing of *Andricus curvator*, Hart., and the inquiline—Hartig's "area radialis brevis, lata; arcola intermedia"—by a wing of *Synergus facialis*, Hart.

It is amongst the Hymenoptera, especially the gall-making species, that some of the most interesting and astonishing problems in insect biology are to be worked out. In gall-makers we have the formation of the gall: the active agent, its development, the life-history of the gall-fly, and the other insect life,—normal, inquiline, or parasitic,—which is also connected with the gall. Of each

of these we know comparatively nothing. When the whole life and surroundings of a single gall-fly can be written, it will doubtless be found to bear directly on many disputed or little understood points of entomological knowledge generally. But nothing can be done without breeding; and when the gall species is correctly determined the gall-maker is easily recognised. For some remarks on the breeding of gall-flies, see the 'Entomologist,' viii. 170. The study of the flies themselves is at present difficult and unsatisfactory; the descriptions may be referred to in the papers mentioned above; and there is a synopsis of genera, by Dr. Förster, in the nineteenth volume of the Vienna 'Verhandlungen' (1869).

Two new European oak species have been described since the appearance of Dr. Mayr's work, viz.:—*Andricus Schröckingeri*, Wachtl. (Verh. z.-b. Gesell. Wien. xxvi. 713), which causes a gall on the leaf of *Quercus cerris* something like that of *S. albipes*; and *Aphilothrix Kirchsbergi*, Wachtl. (Verh. z.-b. Gesell. Wien. xxvi. 713). This last is the *Cynips gemmea*, Gir., which was figured in the 'Entomologist,' ix. 78.

The following is a list of our British oak species as far as our present knowledge goes, giving the name of species in the first column, reference to the gall in the second, the time of appearance of the gall in the third, the time of appearance of the gall-fly in the fourth, and the reference to the description and figure in the last:—

				Vol.	Page.
<i>Biorhiza aptera</i> , Fab.	Root	Spring	November	vii.	3.
„ <i>renum</i> , Hart.	Leaf	Autumn	June	ix.	115.
<i>Neuroterus numismatis</i> , Ol.	Leaf	Autumn	March	x.	67.
„ <i>lenticularis</i> , Ol.	Leaf	Autumn	March	x.	86.
„ <i>fumipennis</i> , Hart.	Leaf	Autumn	March	x.	121.
„ <i>læviusculus</i> , Schenck.	Leaf	Autumn	March	x.	122.
„ <i>ostreus</i> , Hart.	Leaf	Summer	October	x.	161.
<i>Spathegaster baccarum</i> , L.	Leaf	Spring	June	x.	206.
„ <i>tricolor</i> , Hart.	Leaf	Summer	July	x.	234.
„ <i>albipes</i> , Schenck.	Leaf	Spring	May	x.	235.
„ <i>vesicatrix</i> , Schl.	Leaf	Spring	June	x.	250.
„ <i>floeculi</i> , Gir.	Bud	Spring	May	{ ix. 75. xi. 222.	
„ = <i>Giraudi</i> , Tschek.					
„ <i>Taschenbergi</i> , Schl.					
„ <i>aprilinus</i> , Gir.	Bud	Spring	April	ix.	76.
<i>Trigonaspis megaptera</i> , Pz.	Bud	Spring	June	vii.	193.
<i>Andricus noduli</i> , Hart.	Twig	Summer	September	vii.	99.
[„ <i>testaceipes</i> , Hart.	Leaf	(= <i>A. noduli</i>)		ix.	219.]
„ <i>curvator</i> , Hart.	Leaf	Spring	June	ix.	195.
„ <i>inflator</i> , Hart.	Bud	Spring	June	ix.	50.
„ <i>quadrilineatus</i> , Hart.	Catkin	Spring	? February	xi.	133.
„ <i>amenti</i> , Gir.	Catkin	Spring	May	xi.	114.

					Vol.	Page.
<i>Andricus æstivalis</i> , * <i>Gir.</i> ?	.	Catkin	Spring	July	xi.	31.
" <i>circulans</i> , * <i>Mayr.</i>	.	Bud	Spring	April	ix.	51.
" <i>glandium</i> , * <i>Gir.</i>	.	Acorn	Autumn		xi.	205.
" <i>ramuli</i> , <i>L.</i>	.	Catkin	Spring	June	xi.	87.
" <i>terminalis</i> , <i>Fab.</i>	.	Bud	Spring	June	ix.	28.
<i>Cynips Kollari</i> , <i>Hart.</i>	.	Bud	Summer	August	vii.	241.
<i>Dryophanta sentellaris</i> , <i>Ol.</i>	.	Leaf	Summer	November	ix.	121.
" <i>longiventris</i> , <i>Hart.</i>	.	Leaf	Summer	October	ix.	146.
" <i>divisa</i> , <i>Hart.</i>	.	Leaf	Summer	October	ix.	147.
" <i>agama</i> , <i>Hart.</i>	.	Leaf	Summer	October	ix.	150.
" <i>disticha</i> , <i>Hart.</i>	.	Leaf	Summer	October	ix.	171.
<i>Aphilothrix corticis</i> , <i>L.</i>	.	Bark	Spring	April	vii.	50.
" <i>corticis</i> , <i>Hart.</i>	.	} Bark	Spring	April	vii.	52.
" = <i>Sieb.-Idi</i> , <i>Hart.</i>	.					
" <i>radicis</i> , <i>Fab.</i>	.	Root	Spring	April	vii.	2.
" <i>gemmæ</i> , <i>L.</i>	.	Bud	Summer	? April	viii.	146.
" <i>glandulæ</i> , <i>Hart.</i>	.	Bud	Autumn		ix.	1.
" <i>globuli</i> , <i>Hart.</i>	.	Bud	Autumn	February	viii.	254.
" <i>autumnalis</i> , <i>Hart.</i>	.	Bud	Autumn		viii.	255.
" <i>collaris</i> , <i>Hart.</i>	.	Bud	Summer		viii.	280.
" <i>albopunctata</i> , <i>Schl.</i>	.	Bud	Spring	November	xi.	220.
" <i>callidoma</i> , <i>Hart.</i>	.	Bud	Summer		viii.	200.
" <i>solitaria</i> , <i>Fonc.</i>	.	Bud	Summer	September	viii.	169.

Maldon, Essex, September, 1878.

AN INCIDENT IN THE HISTORY OF AMPULEX COMPRESSUM.

By H. S. SCHURR

(Of the Bengal Police, Midnapore).

Received by Mr. G. R. James Rothney, Calcutta.

I HAVE to tell of a real "pucka" bug incident that I saw yesterday, and which may interest you, as a similar incident once before interested you and me in the Fulta Road.

Well, yesterday being a holiday, and I having nothing to do and feeling a bit lonely, I went out for a long exploration on my little pony. I was out ever so long, and came back pretty tired and hungry, and found three men in my rooms smoking, and making themselves quite at home, with kegs, &c. Well, this riled me, as they would not go away; and I couldn't ask them to breakfast as I have only two knives, forks, &c. Well, they eventually departed; and then I had got a headache from my ride, and not getting my tub and breakfast at once. So I laid down and tried to sleep, but it was no use: this man came to call, that man to arrange about rackets, and Chuprassie brought letters and papers to sign, another brought

* Turkey oak species.

recruits for inspection ; and I had'nt a moment to myself, and I was properly savage. Looking about my room to vent my rage upon something, I saw a brown something disappear round a corner, and thinking it was a snake I got up to do for him, with a hearty good will. I was surprised to find it was a common cockroach, in tow of one of those green wasps that we saw throwing those ferocious red and black ants off a tree in the Fulta Road. Well, as the cockroach was ever so much bigger and heavier than the wasp, I was a bit surprised to see how easily Mr. Wasp seemed to be hauling him along, and I was curious to find out how and why he did it ; so I watched him carefully. He had dragged the cockroach all across my room, over the threshold, and out into the verandah, when he let go of his victim ; and, going to a small hole, carefully measured the size every way, then went inside for inspection, and eventually returned to the cockroach, who, strange to say, quietly awaited the return of Mr. Wasp, who now began his preparations for taking the cockroach in tow ; and this is how he managed it. He got hold of the cockroach's feelers,—you know the things I mean, like two long hairs sticking out of his nose, or wherever he may be pleased to carry them ; then the wasp with his mandibles got hold of one of the feelers, and began to pull the cockroach ; but a bit of the feeler broke off ; and the cockroach, instead of trying to bolt, stopped still and twitched all over, as much as to say this is more familiar than pleasant. Well, Mr. Wasp got a good grip of the cockroach, and began to pull him into the hole head foremost : the cockroach allowed him to get his head in, and then, evidently finding the quarters unhealthy and a bit cramped, began to back out vigorously. But it was no go ; the wasp had him tight, and began pulling with a will. But presently Mr. Wasp found his victim was stuck fast, and he was unable to draw him in ; so he immediately set to work to drive out his victim, the victim aiding him in his endeavours with the most hearty co-operation ; and very shortly the cockroach was free, and at large. Having backed about two inches from the hole he very foolishly stopped stock still, and gazed at Mr. Wasp busily engaged in enlarging the hole. Having finished the hole, and finding it to his satisfaction, he quietly got hold of the cockroach by his feelers, and again began to drag him in : it was “a long pull and a strong pull,” but not quite together ; as the cockroach said to himself “This is my last chance, and Providence won't come to help me again.” Alas ! for him, he was quite

right. So he set to work to resist vigorously, and took advantage of every angle in the entrance and every irregularity he could lay hold of. But at last, after nearly five minutes long and steady pulling on the part of Mr. Wasp, he managed to draw him past the sticking point; and then it was all over with the cockroach.

[*Ampulex compressum* is a brilliant green insect, with bright red legs, and is one of the *Sphegidae*. It is well known to provision its nest with cockroaches. It is found in India, China, Borneo, Singapore, Sumatra, Java, Celebes, Madagascar, &c.—ED.]

ENTOMOLOGICAL NOTES, CAPTURES, &c.

VANESSA ANTIOPA IN PERTHSHIRE.—I had the good fortune to capture a specimen of *Vanessa Antiopa* on the west side of Ben Lawers, Perthshire, on August 26th.—A. CRAIG-CHRISTIE; Millnore, Killin, Perthshire, August 29, 1878.

EARLY VANESSIDÆ.—Are not the *Vanessidæ* appearing very early this year? On August 9th I took *Cynthia cardui*, *Vanessa Io*, *V. urticæ*, and *V. C-album*, in North Yorkshire, near Pickering; *Argynnis Paphia* were also plentiful, but much worn. Moths were next to entirely absent; I sugared four times, and only saw six *Noctuæ* in all. *Geometridæ* were very scarce, and only the commonest species were represented.—J. C. WASSERMANN; Cullercoats, September 4, 1878.

ABSENCE OF COLIAS EDUSA IN 1878.—After the extraordinary abundance of *Colias Edusa* last year we might naturally expect at least an average occurrence of this species this year; but in this neighbourhood I have not seen a single specimen. I feel interested to know if this scarcity is universal in England, or only confined to this district. Perhaps some of your correspondents will favour us with their experience in other parts of the country in reference to the occurrence of *Colias Edusa* this year.—W. McRAE; Westbourne House, Bournemouth.

VARIETY OF SUPPOSED SATYRUS TITHONUS.—I am sending to you a sketch of *S. Tithonus*. The specimen appears to me to be a remarkable one in the following particulars: *i.e.*, the ground colour of the upper side of both the fore wings is a pale yellowish brown or buff, relieved by the ordinary orange colouring, which contrasts singularly with the ground colour-

ing; the antennæ and the body of the insect are also buff-coloured; and the specimen, which is in good condition, presents generally a bleached appearance, and more resembles *Chortobius Pamphilus* in general colouring, though not otherwise. The specimen, which is a male, and is rather under the usual size I think, was taken by myself near Tenby, South Wales, in the summer of 1871. In the 'Entomologist' for January, 1878, is figured a bleached variety of *Satyrus Janira*, captured near Dover. I have myself seen bleached specimens of that species, but not of *Tithonus*, and cannot find that it is liable to such variation, or indeed to any variation, except with regard to the size or number of the ocelli.—G. W. OLDFIELD; Weybank House, Guildford, September 4, 1878.

[The sketch sent is of what appears to be a very exceptional variety of *Satyrus Tithonus*, and the foregoing is an accurate description.—ED.]

CHÆROCAMPA ELPENOR.—On September 13th I captured a fine specimen of *Chærocampa elpenor* in a spider's web. Newman states June as the month of its appearance. Does it often occur so late?—H. M. PARISH; Mount Street, Taunton, September 18, 1878.

CHÆROCAMPA CELERIO AT WOODBRIDGE.—My collection has lately been enriched by a specimen of *Chærocampa celerio*, captured at Woodbridge, Suffolk, by E. Cobbold, at about the beginning of September. The moth was found settled on a door, at about 7 p.m., and was knocked down with a handkerchief, which was the cause of its wings and body being slightly rubbed; otherwise the moth is in good condition.—H. GRAVES; 15, Lindore Road, Clapham Common.

ORGYIA CENOSA AT WICKEN FEN.—Mr. Eedle will be interested to know (Entom. xi. 212) that I took five fine specimens of this species at light, in Wicken Fen, at the end of July last: three of them on the night of the 26th; and two, two or three nights later. Mr. Eedle is very likely correct in supposing that the floods several years ago destroyed most of the larvæ; and should a similar occurrence take place now, perhaps the moth would be all but exterminated. On the other hand, however, it is only reasonable to suppose that a few ordinary seasons may bring the species to us again almost as plentifully as ever; especially as only the males seem to come to light, and the females, which we must suppose are almost as numerous, are rarely seen. I

have more fear of the extermination of *Papilio Machaon* at Wicken Fen than of *Orgyia cænosa*; for although we found the larvæ pretty freely, the systematic way in which they are collected must tell upon them before many years hence.—G. T. PORRITT; Highroyd House, Huddersfield, September 3, 1878.

ACRONYCTA ALNI AT HEREFORD.—I found here, on September 7th, a full-grown larva of *Acronycta alni*, on a stile under a black poplar. Unfortunately it escaped from the box in which it was confined, and was killed by a prowling spider. Is not this unusually late for the larva?—H. N. RIDLEY; Bishopstone Rectory, Hereford, September 10, 1878.

RAPHITES QUINQUESPINOSUS AND ACRONYCTA ALNI.—On August 4th I was fortunate enough to meet with a specimen of the *Raphites quinquespinosus* asleep, in a flower of the black knapweed; and on the 21st ult. I found a full-fed larva of *Acronycta alni* on some palings.—E. N. BLOOMFIELD; Guestling Rectory, September 18, 1878.

LEUCANIA ALBIPUNCTA AT CHICHESTER.—I had the good fortune to take a fine specimen of this insect on August 20th, at sugar, on a willow (*Salix alba*) in front of this house. The instant the light was thrown on the tree it fell to the ground, and was lost; but on my second visit it had returned to the sugar, and I then happily secured it. It seems to me, if I may venture an opinion, that to the characteristics given by Guenée, and quoted by Newman in his 'History of British Moths,' for distinguishing this species from *Leucania lithargyria*, might be added the greater brilliancy and whiteness of the spot, which more resembles that of *L. conigera*. The outer elbowed line, too, which in *L. lithargyria* is broken up into black dots is in *L. albipuncta* distinctly scalloped, or extended into seven very acute angles. I am indebted to the kindness of Mr. Buckler for comparisons with a continental specimen in his cabinet.—J. ANDERSON, jun.

LEUCANIA ALBIPUNCTA IN THE ISLE OF WIGHT.—While collecting in the Isle of Wight during this season I had the good fortune to take eight specimens of *Leucania albipuncta*.—J. VENABLES; BARNES.

LEUCANIA ALBIPUNCTA.—While staying at Folkestone last August I took two specimens of *Leucania albipuncta* at sugar; the first, a female, on the 14th; and the second, a male, on the 25th. Both came to sugar rather late in the evening.—F. HEATHERLEY; 79, Newman Street, W., September 19, 1878.

TAPINOSTOLA HELLMANNI IN MONK'S WOOD.—I took two specimens of *Nonagria Hellmanni* while sugaring in this wood, on Tuesday, August 6th, 1878. I believe this to be an addition to the fauna of Monk's Wood.—H. HEBBLETHWAITE; 15, Grove Terrace, Bradford, Yorkshire, September 9, 1878.

MIANA ARCUOSA AND **PLUSIA INTERROGATIONIS** NEAR LONDONDERRY.—I have to record the capture of these two species near Londonderry. I believe *M. arcuosa* has not been taken in Ireland before, and only one specimen of *P. interrogationis*. The former was taken by a friend of mine, Mr. J. Milne. I bred three specimens of the latter, and also captured a few.—W. H. CAMPBELL Ballynagard House, Londonderry, August 16, 1878.

HELIOTHIS SCUTOSA IN CO. DONEGAL, IRELAND.—I had the good fortune to capture a specimen of this rare insect in co. Donegal on August 19th. It was slowly flying over the heather on the side of a small hill on the sea-shore, about 3.30 p.m. As I did not know the species I sent it to Mr. Birchall, who kindly named it for me.—W. H. CAMPBELL; Ballynagard House, Londonderry, September 23, 1878.

AGROTIS AGATHINA AND **THERA FIRMATA** AT SUGAR.—Last Saturday night I took *Ayrotis agathina* at sugar for the first time, although I have sugared in the same locality each autumn for some twenty years. We have taken them hitherto at flowers, or on the wing. I have likewise taken a fine series of *Thera firmata* at sugar, this season.—W. PREST; 13, Holgate Road, York, September 18, 1878.

BOLETOBIA FULIGINARIA.—On July 15th I captured a nearly perfect specimen of this rare moth in a garden here. It is a female, and I got a few eggs from it, though these were unfortunately infertile.—C. G. NURSE; Southgate Green, Bury St. Edmunds.

EMMELESIA TÆNIATA LARVA.—Of this hitherto unknown larva I have at last succeeded in rearing some from eggs. It has baffled me for years to find any special plant to feed it upon. The most likely plant was the enchanter's nightshade. Of this I have beaten acres to no purpose; in fact it seemed a hopeless task even to discover whether the larva was green or brown, or what it was like. Now, however, I am able to give its history up to date. During the month of July I spent nine days in the lake district, and paid special attention to getting this species, as usual. The species only comes out of the dark woods when worn. I secured about a dozen females, all of which I kept to lay eggs. About twenty eggs hatched in

the second week of August. I put in the glass along with them *Hypericum*, enchanter's nightshade (*Circea lutetiana*), dead nettle (*Lamium*), groundsel (*Senecio vulgaris*), knot-grass (*Polygonum aviculare*), and many other plants; and last, not least, a leaf or two of the garden nasturtium. Several of them went to work by making a round hole through a leaf of the latter plant,—one appearing to take better to it than the others,—the rest seem inclined to hibernate, while this one is nearly full fed. It is quite seven-eighths of an inch long; and the following is a rough description:—Ground colour of the back and sides a rich dark salmon, tinted brown at each segment; on the back there is a pale pink lozenge-shaped spot, darker at the edges, and in the centre of the spot is a clear black wedge-shaped mark; the colour on the back at the anal extremity becomes much paler for three-eighths of an inch, and there are two rows of spots of a brownish black down to the anal point; the sides and abdomen are of a pale pinkish yellow, with no other markings than two spots at each segment underneath of this shape; legs same colour as abdomen; the head slightly darker, with short scattered hairs. The habit of the larva is much after that of *Emmelesia unifasciata*: when touched it frisks about, as if it wanted to be played with. I have made a rough sketch and coloured it, so that it may be a guide for another day, until more is known of this northern species.—J. B. HODGKINSON; 15, Spring Bank, Preston, September 12, 1878.

CAMPTOGRAMMA FLUVIATA AT SOUTHPORT.—I took this day, on the sandhills between Freshfield and Southport, Lancashire, a perfect female specimen of *Camptogramma fluvjata*, which I venture to think worthy of record in the pages of the 'Entomologist.'—HASTINGS DENT; 112, Bury New Road, Manchester, August 23, 1878.

MICRO-LEPIDOPTERA LARVÆ ON HACKNEY MARSHES.—During the past three weeks I have met with the following species:—The blotched appearance of the leaves of willow betrayed the presence of *Gelechia notatella*, of which I secured about fifty; and on the same bush were a number of the cones of *Gracillaria stigmatella*; but the latter had mostly quitted their feeding places and retired to the under side of the leaves, where their white, silvery-looking cocoons were not so readily seen. *G. Naviferella* occurred in the leaves of *Chenopodium*, but were scarcer than usual. *G. Hermanella* were tolerably common on the same plants

in sheltered situations, but their mines are far less distinct than the conspicuous white blotches of the preceding. *Coleophora paripennella*: this appears to be a general feeder, having myself found the cases containing larvæ occasionally on wild apple, elm, hop, willow, hawthorn, bramble, blackthorn, dewberry, birch, and hazel, but they give a decided preference to the latter; they are comparatively common this year, and I doubt not may be collected for the next two or three weeks. Among thistles in a well sheltered situation I found eight full-fed larvæ of *Coleophora Therinella*.—W. MACHIN; 22, Argyle Road, Carlton Square, E., September 18, 1878.

THE SEAT OF THE SENSE OF SMELL IN INSECTS.—Those who contend that the antennæ of insects are their organs of scent are sometimes told that there is a total lack of direct observations in support of their view. Whilst declining to admit this assertion (see 'Nature,' July 18, 1878, p. 302) I must beg to mention a few observations I have made upon wasps, and which doubtless numbers of entomologists will be able to confirm from their own experience. That wasps have an acute scent, and seek their prey or their food by its means, will be I think generally admitted. When a wasp alights upon a table, a window, or any other surface, and begins running about in quest of booty, its antennæ are kept in constant play, touching the surface on which the insect is travelling in all directions, in a manner which strongly resembles the action of a dog when seeking something by scent. This week I saw a wasp take a dead house-fly and begin devouring it, its antennæ being all the time rapidly and incessantly touching the carcase. Now we can readily understand an animal sniffing at its food; but no one surely ever saw or can conceive of any creature applying its organs of hearing to the object it was devouring. Another wasp having found a dead companion on a shelf began to eat it,—the only instance of cannibalism I have noticed in the species,—using its antennæ in precisely the same manner. When a wasp is flying it keeps its antennæ advanced and extended, so as to be in the most favourable position for receiving the impression from any odoriferous substance. These facts I submit agree perfectly with the hypothesis that the antennæ are the organs of scent. That they may possibly subserve other senses, also, I do not seek to deny.—J. W. SLATER; 3, Bicester Road, Aylesbury.

INSECTIVOROUS PLANTS.—Referring again to the subject of

insectivorous plants, introduced in the September number of the 'Entomologist' by Mr. Corbin (Entom. xi. 197), I must say that I think the use of the various epidermal appendages of plants has not yet received sufficient attention, since doubtless through the hairs, glands, &c., plants obtain a large proportion of their food; in fact these appendages may be considered as embryo roots. Take for example a plant growing in rich moist soil, and observe the more generally glabrous character of its foliage; and then observe even the same species in an arid situation, and see the profusion of hairs with which it becomes covered, acting doubtless not only as means to obtain food by absorption of nitrogen from the dew, &c., but also for protecting the plant from too great heat or cold. Besides the plants noticed by Mr. Corbin as insectivorous *Saxifraga tridactylites* may be added, as being able not only to retain, but also to assimilate, insects; and the various Saxifrages,—*Saxifraga geum*, *S. umbrosa*, *S. granulata*, *S. hirsuta*; *Chrysosplenium*; &c.,—all are clothed with hairs extremely sensitive to ammonia, as discovered by Dr. Darwin, and on which insects frequently get caught. The various *Silenæ* are named catchflies, from the same property; but as yet I have not found that assimilation follows the capture of insects by them. This property is possessed also in a large degree by the lovely *Menziesia polifolia*, the viscosely hairy peduncles always having some Diptera attached. I have noticed also insects dead or dying on *Diotis maritima*, in Jersey; on *Picris hieracioides*; on *Silene conica*, *S. quinquevulnera*, *S. anglica*, *S. noctiflora*, and *S. nutans*; and on *Cerastium tetrandrum*: the latter had several small beetles adhering to it, *Epilobium parviflorum*. On the connate leaves of *Dipsacus* plenty of insect debris is always to be found; and Mr. Francis Darwin has recently made a most interesting discovery of the means by which nutriment is obtained from the liquid contained in these connate receptacles. *Senecio viscosus* and *S. sylvaticus*, *Sonchus arvensis*, *Hyoscyamus niger*, and various *Orobanchaceæ*, also have been noticed with adhering insects. It is worth remembering that plants entirely destitute of hairs, notably our indigenous *Orchidaceæ* and *Siliaceæ*, generally have excessive root development, as bulbs, tubers, &c.; and also that the *Orobanchaceæ*, often parasitic upon plants totally insufficient to yield the nourishment for such large plants, are covered with long glandular hairs, through which a very considerable portion of nutrition must be obtained; and like the *Drosera*, *Pinguicula*, *Corallorhiza*, *Neottia*

nidus-avis, &c., are almost destitute of chlorophyll, although it exists in a passive condition in many of these plants. Attention to this interesting subject must yield many important discoveries; and to none could the study be more suitable than the readers of the 'Entomologist.'—G. C. DRUCE; Northampton Natural History Society.

ADDITIONS TO THE DOUBLEDAY COLLECTION.—The notice in the exchange list of the September number of the 'Entomologist,' that fresh specimens of no less than 238 species of Lepidoptera are required for the "Doubleday Collection" at the Bethnal Green Museum, must surely be a matter of surprise and regret for the majority of entomologists. In this regret I fully share, but I must confess that I am not surprised. Soon after the Collection was received at Bethnal Green, and before the public were admitted to see it, I went through it, and called the attention of the authorities of the Science and Art Department, at South Kensington, to the fact that many specimens were in imminent danger of destruction by mites, and offered, as a labour of love, to endeavour to check this threatened destruction. In consequence of my letter I was asked to meet Mr. Matchwick (under whose control, I believe, are the natural-history collections) and the late Mr. Andrew Murray. It was then decided that, previous to moving infected specimens, a catalogue should be made, and that then the mites should be attacked. The making of this catalogue I superintended, and I understood Mr. Murray would then eradicate the mites. Immediately after the demise of Mr. Murray I heard that the destruction of the specimens was progressing, and I again wrote to the authorities at South Kensington Museum offering my services. My letter was acknowledged, and an answer promised,—which, by the bye, I have never received. The mites in the interval have, I presume, had it all their own way, otherwise a request would not now be made for 238 species. I am afraid that the want of care,—I can call it nothing else,—which has permitted this loss of Lepidoptera, will not encourage entomologists to come forward to jeopardise further specimens; besides the Collection will be the "Doubleday" Collection but in name, if it is to be formed of specimens with which Mr. Doubleday had nothing to do. The proposal revives the story of Jack's knife; and of the celebrated old musket, of which nothing remained but the touch-hole. I notice the appeal is made "out of respect for the memory of the Founder." Out of such respect I made my offer of free service. Surely respect would have been

better shown by preventing the loss of the specimens.—
A. B. FARN; Dartford, September 9, 1878.

[In justice to Mr. Murray it may not be out of place to mention that the immediate cause of his last and fatal illness was the amount of chloroform inhaled by him when working for the preservation of the Doubleday Collection. At first he used the chloroform every day; then he attended once a week; but succumbed altogether at last. Whether the remedy was a wise one is not now under discussion.—E. A. F.]

THE DOUBLEDAY COLLECTION.—The announcement in the exchange list of the September number of the 'Entomologist,' that this collection is to be put "in proper order," by adding "fresh specimens," &c., will I am sure be received with painful surprise by many of the lepidopterists of this country. The great interest which centres in the Collection at Bethnal Green arises solely from the fact that it is *the Collection* formed by the late Henry Doubleday, and, as such, is looked upon by the present generation of lepidopterists with a feeling almost akin to reverence. Once begin adding to, or taking from it, and this interest ceases for ever; and the Collection at once descends to the level of that of any ordinary museum. With proper care it will keep, *as it is*, for many years to come. I grant, of course, that the contemplated "improvements" would make it more valuable in an educational point of view. If the museum authorities want a collection for this purpose (and every museum ought to have one), let them get a new cabinet and start a fresh collection; when I venture to say our lepidopterists will send their duplicates to it with far greater alacrity than they will in the former case.—G. T. PORRITT; Highroyd House, Huddersfield, September 3, 1878.

TAPINOSTOLA BONDIL.—I observe in the exchange list of the 'Entomologist' for September the above species offered, and marked *bred*. This must surely be an error, otherwise someone is, I fear, losing the great credit due to so important a discovery. Also in some of the exchange notices would it not be better to distinctly notice which were British insects, and which continental types.—W. PURDEY; 132, Dover Road, Folkestone, September, 1878.

[This was a compositor's error, owing to bad copy: the word "*bred*" applied to preceding species, *Cynipiformis*, as printed in August number. Continental specimens should always be so designated; but see notice at head of exchange list.—Ed.]

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IDENTITY OF EPHIPPIPHORA OBSCURANA (Steph.) AND E. GALLICOLANA (Zell.).

By WALTER P. WESTON.

WILKINSON, in his work on the British Tortrices, describes this species as *Semasia obscurana*, which description Mr. C. G. Barrett, in his excellent "Notes on Tortrices" (E. M. M., vol. x. p. 144), considers more applicable to *Gallicolana*, Zell., and he then gives his reason for his opinion, and the chief points in which that species differs from *Obscurana*, which are "the greater breadth of the fore wings, the more upright, clearer, and whiter dorsal blotch, and the more richly coloured apical space." Mr. Barrett then gives Stephens' description of *S. obscurana*, Steph. I have always been disposed to consider these two insects as one and the same species, thinking *Obscurana* to be only smaller and worn examples of its congeners, to which it is most closely allied; but it was only this season that I bred sufficient numbers to satisfy myself as to their identity. For the last four or five years I have captured a few specimens of *Obscurana*, Steph., every year, and amongst them one which closely answered the description of *Gallicolana*, Zell. Mr. Barrett, however, to whom I sent it, returned it to me as a variety of *Obscurana*, but closely approaching *Gallicolana*, having the costal spot white and very decided, but the fore wings were hardly broad enough.

Last season I collected several oak galls (chiefly those of *Cynips terminalis*), from the very trees round which I had been accustomed to take *E. obscurana*, and succeeded in rearing four undoubted specimens of *E. gallicolana*, all of them being larger than *Obscurana*, the ground colour of the fore wings darker, and the costal blotch very clear and decided, but as variable in shape as it is often found in different examples of *E. cirsiaria*. These specimens, which consisted of one male and three females, were all 8 to 8½ lines in expanse.

Following up my success I bred this year, from galls from the same locality, seventeen or eighteen specimens, varying greatly in size, intensity of colouring, and in the shape and size of the costal blotch. Of these the largest was close on nine lines across, and the smallest under six lines. In some the costal blotch was clear and white, in others it was traversed by two distinct brownish lines, darkest on the costa and sloping towards the apex of the fore wings, and in the remaining examples the blotch was more or less suffused with a brownish tinge.

I was only able to capture two examples this year, but my friend Mr. Howard Vaughan, who was more fortunate, kindly lent me his series for comparison. Nearly all the captured specimens are considerably lighter than the bred ones, and the costal blotch, instead of being white, is of a light brownish grey tinge, in which the darker traversing lines mentioned by Wilkinson are very distinct. Noticing that the more worn a specimen was, the darker the costal blotch became, and the nearer it assimilated to the ground colour of the fore wings, and thinking the white blotch might be formed by an outer layer of scales which would soon wear off with the flight of the insect, I allowed a bred specimen, with a very distinct white blotch, to remain in the breeding cage. It fully answered my expectations, on the second day of its existence the blotch being of a light brown colour, and the velvety appearance of the fore wings having entirely disappeared. Altogether it presented a most distinct appearance, so far as colour was concerned, from its bred companions. In none of my specimens have I been able to find the "lustrous blue markings towards the apex of the front wings," as mentioned by Wilkinson. According to the custom of priority of nomenclature, Professor Zeller's name, *E. gallicolana*, should be adopted for this species.

Ephippiphora gallicolana must be considered as a local rather than a rare insect. It is to be found at Tilgate Forest, and, nearer London, at Epping and Darenth Wood. I have also taken it at West Wickham and Highgate Woods; but my first specimens came from a small oak copse close to the Alexandra Palace, and I am sorry to say since destroyed. It flies at dusk round the boughs of the oaks, and always high; its flight is slow and steady, which enables it to be at once distinguished from *Phoxopteryx Mitterbacheriana*, which is usually out in abundance at the same time. The time of

appearance of the moth is somewhat irregular, occurring from the middle of May to the middle of June, but the latter end of May is the best time to look for it. *E. gallicolana* may be reared from the galls of *Cynips terminalis*, which are to be found in plenty in the autumn, and it prefers those of the preceding year's growth. When the imago emerges the pupa case is left sticking half-way out of the gall, and in some cases the moth emerges by the hole eaten by the *Cynips*, but in others makes one for itself, and in this case a small beautifully round cap of the outer surface of the gall is pushed out and left at the side of the pupa case.

I have bred this Tortrix from some galls from which the *Cynips* has never emerged, and which had no apparent hole in them, clearly showing that the larva must have lived in them, and could not have gone into them to pupate as *Heusimene fimbriana* undoubtedly does. I have never found more than one moth emerge from each gall, and the proportion of galls containing this insect is two or three per thousand.

This insect seems somewhat out of place in our lists, being far more closely allied to *Coccyx argyrana* than to *Ephippiphora populana*. As in *C. argyrana*, the posterior wings of the males have a wide pale patch in the centre, surrounded by a darker outer margin. Indeed in shape and markings it very closely resembles that species, being distinguished from it by the uniform dark brown ground colour of its fore wings, and by its later appearance in the imago state. From the same lot of galls I reared four *C. argyrana*, a few *C. splendidulana* and *Heusimene fimbriana*, besides two specimens of both *Catoptria Juliana*, and *Eupæcilia maculosana*, the latter not being usually considered an inhabitant of galls in any stage of its existence.

1, Duncan Terrace, N., October, 1878.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. X. NYMPHALIDÆ — NYMPHALINÆ.

(Genera allied to VANESSA, continued.)

AMONG the commonest and most widely distributed of the exotic butterflies are those belonging to the genus *Junonia*. As now restricted, it includes several species with smooth

eyes (those of the *Vanessæ* are hairy), and with fore wings but slightly emarginate, and hind wings rounded and slightly dentated. They are insects rather larger than *Vanessa Urticæ*, of a black, brown, or occasionally greyish colour, generally adorned with two eyes on the hind wings and one towards the hinder angle of the fore wings. Several species are common in every collection from the East Indies, such as *J. Lemonias*—brown, the eyes with blue pupils, and standing in reddish orange rings; the fore wings are spotted with buff. *J. Laomedea* is of a slightly iridescent grey, with transverse zigzag brownish lines, and a row of rather small eyes beyond the middle, of which two towards the tip and one towards the anal angle of each wing are more distinct than the others, and consist of an outer brown ring, an inner grey or buff one, and a black pupil surmounted with orange. Another East Indian species is *J. Orithya*, a rather smaller insect; the fore wings black, with buff apical markings, and the hind wings broadly blue towards the hind margin. The eyes consist of two black rings, separated by a red one, and the inner one nearly filled by a lilac spot. The African *J. Clelia* resembles this, but is larger; the hind wings are black, with a very large round blue spot at the base. The same character is repeated in the African and Asiatic *J. Cœnone*, but the centre of the fore wings and the marginal half of the hind wings are filled up with pale orange, and the eyes are very small and inconspicuous. *J. Asterie* and *J. Almanæ* are both fulvous, with two eyes on each wing, that nearest the tip of the hind wings being very large, purplish, marked with a large black spot, surmounted by two small white ones, and enclosed in a buff ring partly surrounded with black. *J. Almanæ* is more angulated than *Asterie*; the hind wings are produced into a lobe at the anal angle, and the eyes of the under side are very indistinct. The Australian *J. Vellida* is brown, with the eyes very broadly surrounded with fulvous, and the fore wings with two fulvous markings in the cell and buff markings towards the tip. The South American *J. Lavinia* closely resembles this, but is very variable, and many of its varieties have received different names. *J. Cœnia*, from the Southern States, is of a light brown, with the eyes surrounded with buff, and the first eye of the hind wings as large as in *Asterie* and *Almanæ*.

Precis, the largest genus of the present group, is African, though a few are East Indian. The wings are generally dentated; the fore wings generally more or less angulated,

and occasionally almost hooked, and the hind wings often produced at the anal angle. We rarely meet with large eyes, as in *Junonia*, though sometimes with a row of small ones towards the hind margins of the hind wings. The beautiful blue *P. Rhadama* of Madagascar, however, has eyes placed as in *Junonia*. The species of *Precis* are generally brown, sometimes almost without paler markings, but they are generally banded with some shade of fulvous, and occasionally marked with blue or red. The species are too numerous to describe in detail. The beautiful brown and fulvous *Thaleropsis Ionia*, from Asia Minor, is allied to this genus.

Rhinopalpa is a Malayan genus, including a few large species, three or four inches across the wings. The fore wings are angulated and almost hooked, and the hind wings are nearly square, with a strong projection in the middle. *R. Polinice* is fulvous, with black borders, and *R. Sabina* dark brown, with a broad tawny band across both wings, and a large spot near the tip of the fore wings.

The African genus *Salamis* resembles this in size and shape. *S. Anacardii*, a remarkable iridescent butterfly, is at once the commonest and the best known species of the genus. *Napeocles Jucunda*, the only South American species allied to *Junonia*, is a large black insect, with hooked fore wings and rounded hind wings, a broad blue band across the centre of all the wings, and a blue spot near the tip.

NOTES ON ACIDALIA CONTIGUARIA.

By S. J. CAPPER.

I SPENT the month of July, 1874, at Llanfairfechan, North Wales, devoting every spare hour to the collecting of Lepidoptera, in which pursuit I was assisted by two or three of my sons and my late friend Mr. Alfred Owen. On returning from Penmaenmawr one evening we were pleasantly surprised on opening our pill-boxes to find a specimen of *Acidalia contiguaria*. This species had then become, as we believed, almost extinct. Mr. Greening, of Warrington, who had been in the habit of breeding the insect, had lost all his larvæ. The source of Mr. Greening's specimens was, I believe, one fertile female, captured near Bangor. At the time of which I now write we were about to leave Llanfairfechan in a few days, so we devoted our time to the most diligent search, and were fortunate in obtaining a few more specimens.

The following July I spent with my family at Penmaenmawr, when, pursuing our search for *A. contiguaria*, we took a few dozen specimens, and I sent eggs to friends; but none were successful in rearing the larvæ.

Last summer (1877) we spent at Llandudno, and nearly every day visited the locality for this moth, and were again successful. I gave Mr. Sidebotham, who was staying at Llandudno, several living specimens, and both he and myself were this time fortunate in rearing the insect.

This July we again spent at Llanfairfechan, but for some reason or other the insect was not so abundant as in former years, and with the greatest diligence we could only take very few specimens.

The distribution of this moth, I believe, extends all over the heath-clothed mountains of North Wales, for we have taken occasional specimens from Conway to Aber, and I know a few specimens have been taken at Bethis-e-Coed. Excepting a few specimens taken on the wing, quite at dusk, all our captures were sitting on the rocks. We have spent evening after evening trying to take the moth on the wing, as it seems natural to expect the flight at dusk, but hitherto we have met with very little success; and I am inclined to think they are at no time very active.

In captivity the moth is double-brooded, the first brood appearing in July, and the second towards the end of September or early in October. The larvæ feed on heath, knot-grass, and chickweed.

Huyton Park, Liverpool, October, 1878.

NEW BRITISH CRABRO.

By EDWARD CAPRON, M.D.

DURING the past summer I took a fine male *Crabro*, belonging to the group with *scutellate* anterior tibiæ, which I could not refer to any described British species. I have lately shown it to Mr. Frederick Smith, who, on referring to the continental specimens of the Museum, found it to agree entirely with *Crabro pterotus*, Panzer, a species which inhabits France, Germany, Austria, and Sweden. As this is the first recorded instance of its capture in England I subjoin a short description of it:—

CRABRO PTEROTUS, *Panzer* (mas).

Length $4\frac{1}{2}$ lines. Exp. alar. 6 lines. Head black, closely and moderately finely punctured; stemmata in a curve; clypeus and inner orbits with silvery pubescence; mandibles ferruginous in middle. Antennæ with flagellum broadly filiform, flattish; first seven joints ferruginous beneath, last four and scape entirely black. Thorax slightly pubescent, diffusely and strongly punctured. Anteriorly a slight depression, in the centre of which is an elevated line, and two shorter ones laterally. Metathorax very coarsely rugose; scutellum smooth, with a few fine punctures. Femora black, middle pair with a broad yellow streak above; lower margin quite smooth, not denticulate, as in *C. patellatus*. Tibiæ yellow, anterior pair dilated into a convexo-concave plate, which is black, and streaked with well-marked whitish radiating lines. Posterior pairs with a slight ferruginous stain in the middle above. Tarsi yellow, with last joint fuscous. Anterior pair dilated, and last joint produced into a triangular plate, having two short acute spines, one pointing forwards and the other backwards. Abdomen elongate-ovate, black; second segment with a roundish yellow macula, having sometimes a black centre, and forming a nearly perfect circle on each side, and a semilunate yellow patch laterally and towards the apex of the third segment. Hab. Shere, Surrey, July, 1878.

Shere, near Guildford, October 15, 1878.

LIFE-HISTORIES OF SAWFLIES.

Translated from the Dutch of Dr. S. C. SNELLEN VAN VOLLENHOVEN,

By J. W. MAY.

(Continued from vol. x., p. 279.)

CRYPTOCAMPUS ANGUSTUS, *Hart.*

(*Hartig, Blatt und Holzwespen*, p. 222, No. 1.)

Cryptocampus niger, in latere nitidissimus, antennis in mare elongatis brunneis, supra fuscis, in femina brevioribus totis nigris, alarum stigmatibus bicolore, pedibus dilute fulvis, coxis, femorum basi et tarsorum ultimis articulis nigris.

As an appendix to the description of the previous species,* which lives in excrescences on the leaves, I add the histories—very imperfect, it is true—of two species of sawflies,

Nematus Lugdunensis, Voll.

the larvæ of which live in the interior of the branches of the willow. I must premise that I am unacquainted with the larvæ themselves, and I begin to fear it may be years before I have an opportunity of seeing them, even if I ever do so; it seems to me that for their better recognition it may be as well to publish the description of this species after that of the sawfly inhabiting the leaf. I was the more unwilling to keep back the description of *Lugdunensis* until I had met with these larvæ, as it is uncertain whether the latter of the two pith-dwellers occurs in the Netherlands, a fact which does not appear from the description by De Geer. By the kindness of Mr. C. Ritsema I received two individuals of *Cryptocampus angustus*, a dead male, and a living female, with the twigs in which were the cocoons, and in which the insects had undergone their metamorphosis. The twigs consisted of the top ends of the common willow (*Salix cinerea*); they had been cut off in the neighbourhood of Oegstgeest, and because there was a hole in one of them they had been opened, one being found to contain a part of a cocoon. At the time they were cut off it was rather cold—it was in the month of March—and there was, consequently, no immediate prospect of the insects inhabiting them making their appearance.

The cocoon found in the hollowed-out pith of one of the branches was cylindrical, with rounded ends, its substance being thin but tough; the colour was pale purplish brown. I am unable to determine whether the larvæ had fed on the pith of these willow-twigs during their whole lives, or whether they had hollowed out the pith merely for the purpose of spinning up. According to what Dr. Hartig states, it might be assumed that the larva had inhabited the interior in the earlier stages of its existence instead of first feeding upon the leaf. This point, must thus be left for determination by future entomologists. The following is a description of the two sexes:—

Male.—Length, five millimetres. Shining black, glabrous. Head but slightly prominent, broad, with two grooves anteriorly along the eyes, hollowed out posteriorly; eyes projecting, these latter black and shining. Trophi brownish; the margin of the labrum hairy; mandibles black at the tips, palpi fuscous. Antennæ two-thirds the length of the body and moderately thick; the first two joints black, the remaining joints dark brown on the upper side, pale brown on the under side; on the last joint (the ninth), there is a small bent

up knob, as if there were a tenth joint. Thorax but little wider than the head, entirely black, even the apices of the prothorax being of that tint; the sides very shining. Wings strongly iridescent, nervures brown, costa fuscous; stigma whitish in front, dark grey behind. Abdomen narrower than the thorax, elongate, entirely black, with the exception of a tinge of pitch-brown on the anal valve. Legs black from the insertion of the coxæ to two-thirds of the length of the femora, the remainder reddish yellow, excepting the last joint of the intermediate and posterior tarsi, which are dull black.

Female.—Four to five millimetres. Resembling the male, with the following exceptions:—Head somewhat more projecting; antennæ not longer than half the body, entirely black and thinner; ninth joint shorter than the eighth, and wanting the bent knob at the end. Abdomen broader in the middle than the thorax; the valves of the saw project very far, and are covered with hairs; above them are two abdominal processes. The saw is of a very pale brownish yellow.

As regards coloration, this insect entirely agrees with *Pristiphora testaceicornis* of St. Fargeau, as described by that author and Stephens, but it is entirely different as regards the neuration of the wings, as in the species described by the writers above mentioned the first submarginal cell is stated to be very large, and to receive the two recurrent nervures which in the present species are received by the second submarginal.

CRYPTOCAMPUS MUCRONATUS, *Klug.*

(*Hartig, Blatt und Holzwespen*, p. 223, No. 2.)

Cryptocampus niger, in dorso thoracis subpubescens, antennis in mare brevibus, crassis, brunneis, in femina brevioribus nigris, alarum stigmatibus in femina tantum bicolore, pedibus e brunneo luteis, coxis fere totis nigris.

I am not sure whether this species is indigenous, but as it occurs in the countries both to the east and west of us, in Germany and England, it may be considered probable that it is to be met with here. I add the description to that of the preceding species on account of the great similarity of the two.

Mucronatus lives in the sickly swollen twigs of a species of willow (*Salix*); I received the galls, if I may so call them,

from my friend, Professor Westwood, at Oxford, but without any notes, except that the twigs were from the willow; I received at the same time a quill containing some imagos, both male and female, produced from the galls.

I conclude that this is the species described by De Geer in his 'Memoirs' (German translation, vol. ii. p. 271 *et seq.*, pl. 39, f. 1—11), and by Dahlbom in his 'Clavis novi Hymenopterorum Syst.' (p. 28, No. 38), and called by the latter *Nematus Pentandrae*, mihi, with a reference to Linnaeus' 'Fauna Suec.' (ed. 1, num. 943.) According to both these writers more than one larva is contained in these galls, that is to say, two, three, or four, or even five living together; they remain in this state until the end of April, when they change to pupæ, still within the gall. The larvæ are greyish, and toward the end of that stage they acquire a purplish tinge. The cocoons are thin, and of a coffee-brown colour. The pupæ are greyish white with a purple tinge; those of the male are smaller than the pupæ of the female; the eyes, though probably only towards the end of the pupa state, are dark red. The imagos, it seems, appear in the middle of May; they gnaw a circular hole in the gall, through which they make their escape.

The following is the description of the imagos which were sent to me:—

Male.—Length, 5·5 millim. Shining black, with an extremely short and fine whitish pubescence on the head and thorax. Head somewhat more protruding than in the former species, and destitute of grooves. Trophi and cheeks very pale brown, except the tips of the mandibles, which are shining black; palpi pale brown. Upper lip pubescent. Antennæ not more than half the length of the body, thick; the joints sharply divided from each other and thickened below; the first two joints black, the others brown, darker towards the base on the upper side. Thorax narrower than the head, very shining on the sides, with brown tegulæ. Wings iridescent, nervures black; stigma black, with the exception of a brown spot at the base. Abdomen narrower than the thorax, shining black, with the exception of the anal valve, which is of a brown tint. Coxæ black nearly to the tip, apophyses pale brown; femora blackish at the base and thence brown, of which colour are the tibiæ and tarsi, except the posterior tarsi, which are blackish.

Female.—Somewhat smaller. Exactly similar to the male, with the following exceptions:—The antennæ are shorter,

and entirely black as far as the last joint, which is brown. The abdomen somewhat thicker, the valves of the saw black and hairy, the anal processes projecting considerably. From half-way the femora the legs are entirely red-brown and shining, with the exception of a longitudinal black line on the under side of the femora. The wings have the stigma white at the base.

NOTES ON COLLECTING IN GLEN TILT.

By F. BUCHANAN WHITE, M.D., F.L.S.

It is a very long time since Mr. Douglas, climbing up Ben Ghlo, found the first British specimen of *Pachnobia alpina* sitting on a rock, and contemplating (let us suppose) the beauties of Glen Tilt. After having yielded *Pachnobia*, no more is heard, entomologically, of Glen Tilt for many years, when the announcement is made that *Crambus myellus* has been captured there. Again the glen rested for a few years till a favoured few had opportunities of exploring its inmost recesses, and bringing to light its hidden treasures.

Those collectors who have been "privileged" to visit the happy hunting-grounds of Rannoch must not think that Glen Tilt is at all similar in its physical features. In the one case you have a large lake surrounded by extensive woods of birch or fir, giving way in many directions to natural meadows or heather-clad moors, and backed by mountains of various altitudes and at various distances. In the other, at least in so far as the part of it I am about to describe is concerned, you have a long and very narrow valley, through which darts a rapid mountain stream, from whose banks the hills rise, almost directly, in steep green slopes, topped here and there by rugged rocks or banks of loose stones. Trees there are almost none, except a few alders and birches beside the river, or in some of the almost inaccessible ravines, down which the tributary streams pour their waters into the Tilt. Lower down the glen trees become more numerous, and at Blairathole form large and varied woods, but in the part of the glen where most of our collecting has been done trees are few and far between. Through the glen goes a rough road, connecting Blairathole and Braemar, and which is only a bridle-path for many miles. (I ought to mention that though this road can be used by the public, there is no liberty to go off it, and that all the district is strictly "preserved" and well guarded).

With these preliminary remarks I will now invite my readers to accompany me on a short excursion, promising not to take them more than a half a mile or so from the house where our head-quarters are. Within the grounds are three or four trees, and off one of them we begin the day well by taking *Anticlea sinuata*. This is rather a surprising capture in an alpine glen, but is not unparalleled, for on a stone close at hand we find *Melanippe galiata*, *Larentia cæsiata* and *Emmelesia ericetata* sitting side by side, and, on a rock about a stone throw off, *Larentia ruficinctata*. Take a look at that bed of yellow saxifrage, *Saxifraga aizoides*, and after boxing a few *Zelleria saxifragæ* we will begin to ascend the hill. Here we see abundance of the pretty flowers of the rock rose, and flitting about them *Lycæna Artaxerxes* gives many an opportunity of using our nets. Mounting a little higher, we carefully scan the large stones that dot the slope, and are soon rewarded by finding *Dasydia obfuscata* and *Plusia interrogationis*. A dark moth rises, and after a short chase is secured, and turns out to be a very fine *Stilbia anomala*. Coming to a ravine, we very quietly and cautiously inspect an overhanging rock, and find *Eupithecia constrictata* and *E. pulchellata*, sitting amidst a host of *Larentia cæsiata*, &c. A particular rock of this character (*i. e.* overhanging a mountain stream) is known to us as the "*sinuata* rock," because it has more than once yielded *Anticlea sinuata*. Further up the stream we notice a number of moths flying gently about and settling on the grass stems. These we soon discover to be *Ablabia argentana*, a moth which at first we thought was confined to one place in the glen, but which we now know is distributed over several miles. Along with it, if we are lucky, we may get *Scopula decrepitalis*, but it is rather late in the season for that species. (By the way, I would take this opportunity of asking any one who knows the habits of this species to kindly give me some information about it. I have only met with it twice, once in Inverness-shire, and once in Glen Tilt, and in both times it was in a ravine. What I wish to know is, at what time of the year is it most abundant, and what is its hour of flight?)

Pursuing our way up the stream, we come to some grassy slopes, over which *Erebia Epiphron* is flitting about; as usual, in more or less damaged condition. We have now to cross a slope of loose stones, and had better keep a sharp look-out for *Crambus ericellus*, which, in Glen Tilt at least, frequents such places, and has the provoking habit of diving into the crannies where it is impossible to get at

it. On these stones, too, we take *Scoparia muralis* and *S. atomalis*, which latter is, I think, nothing more than an upland form of *ambigualis*. We have now attained a height of 800 or 900 feet above our starting-point, which was 1000 feet above sea-level, and have passed the steepest part of the slope. The vegetation here begins to change its character, large beds of *Vaccinium*, of several kinds, replacing the rock-rose and other plants which adorned the lower part of the hill. The slope also is not at so great an angle. We now begin to meet with some of the more alpine insects, though some of those we have already noticed still maintain their ground. *Larentia salicata*, though not confined to this altitude, is certainly more common, and as the afternoon advances begins to fly freely. We also find that variety of *Chelonia plantaginis*, which has the usual yellow markings replaced by white, but it too can be found lower down. A curious form of *Coremia ferrugata*, which puzzled us for a long time, occurs up here as well as lower down, as does *Coremia munitata*. The latter may, however, be taken more freely flying at dusk. Amongst the bilberry we will find *Penthina Staintoniana*, which requires the sun to be shining to tempt it out. This species was at first supposed to be attached to the bear-berry, *Arctostaphylos uva-ursi*, with which plant it has no connection. In damp grassy places *Scopula uliginosalis* affords some employment for our nets; and so we go on, picking up various species, till we reach the ridge of the hill. Here only a very stunted vegetation grows, composed of heather, grass, the mountain azalea, &c., leaving many dry, bare, stony places. Advance cautiously to such a place, holding the net in readiness. See, a black shadow rises from a small stone and flits away. Get the net over it, and behold! you have taken one of the most alpine of our native insects, *Psodos coracina*. There is still another, even more alpine species, and if we are lucky we may meet with it, but we must go higher first. Passing over some peaty ground, we search among the cloudberry, *Rubus chamaemorus*, a very humble relation of the familiar lowland raspberry and blackberry, and catch sight of a little moth somewhat like an *Argyresthia*. Carefully searching, we fail to net any specimens, and what the beast was remains a mystery to this day. Our private idea is that it is an unknown new British species, and if we are not so fortunate as to solve the enigma, let us hope that some one else will. *Apropos* of the cloudberry, we have found the leaves mined

by a *Nepticula* which we suspect is the North European species, *tristis*.

We now come to a higher plateau, similar to the one we have just left, and commence to search for *Pachnobia*. Carefully inspecting stones is rather slow work when not rewarded by finding anything, and the stones are legion (even when the amusement is varied by getting an occasional *Psodos* who comes to see what is going on), so we try tearing up and examining the moss. This is a little more lively, as an empty chrysalis-case (not to mention numbers of a bug new to science, *Orthezia Signoreti*) rewards our efforts, but after a while we tire of that too. A herd of red-deer galloping past attracts our attention, and then, "Hi! mark that thick body," and in half a minute more the net is over *Pachnobia* as he flies past. After a more or less (probably very much less) successful search for more, we turn our faces homewards, and finish up the day by sugaring the palings and stones near the house, where, if fortunate, we may get *Crymodes exulis*, and then go to our well-earned beds and dream of all the new things we *may* get next day.

In this slight sketch of the Lepidoptera of Glen Tilt, I have merely mentioned the chief species that have been taken within half a mile or so (as measured on the Ordnance map*) of our head-quarters, and do not mean to say that we took them all on one day, though I believe that that would be quite possible. On another occasion I may describe a day's collecting in another part of the glen.

Perth, October, 1878.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ABSENCE OF COLIAS EDUSA.—As for the "absence of *Colias Edusa* in 1878" I can answer for its scarcity in Swanage (Dorset), Weston-super-Mare (Somerset), Sheerness (Kent); and, while in other years I have caught them in some of the woods round Highgate, I have not seen one this year.—M. B. H. LANE; 70, Junction Road, Highgate.

ABSENCE OF COLIAS EDUSA.—In reply to Mr. McRae, I have not seen a single specimen of *Colias Edusa* this year near Taunton, Somerset, where last year I saw it in great pro-

* That is, on the level. The difference in altitude between our starting-point and the *Pachnobia* plateau is very nearly 2000 feet, so the intelligent reader can calculate what the working distance is. I make it about an hour and a half's steady walking up a very steep hill.

fusion. I may also add that in Switzerland I only saw two specimens, where I captured *C. Hyale* in great profusion.—R. ADAIR; St. Leonards.

SCARCITY OF *COLIAS EDUSA*.—I captured one specimen of *C. Edusa* at Exmouth at the beginning of August, but in this locality, though very common last year, I have not seen a single specimen, so that my opinion coincides with that of your correspondent.—E. C. DOBREE FOX; Castle Morton.

DISTRIBUTION OF *APATURA IRIS*.—With respect to the distribution of *Rhopalocera*, and the eastward thinning of *Apatura Iris*, lately in question, I can affirm that this species was formerly abundant in pheasant copses at Botley, Hampshire. It was also taken at Fareham.—A. H. SWINTON; Binfield House, Waterden Road, Guildford, October 11, 1878.

HYBERNATION OF *SATYRUS ÆGERIA* IN THE PUPA.—I should be glad to know if it is unusual for *S. Ægeria* to hibernate in the pupa. I have a few larvæ which have been kept as naturally as possible on couch grass, one of which turned to a pupa on the 10th, and the others are nearly full fed.—R. M. SOTHEY, Sunny Side, Hastings, Oct. 15, 1878.

VARIETY OF *VANESSA IO*.—I have to record a variety of *Vanessa Io*. I took the larvæ on July 10th, at Grange, and bred two specimens of the variety; it is entirely without the red-brown scales on the fore and hind wings, which gives it a curious semi-transparent tint.—HENRY MARSH; Wellington Street, Leeds, August 26, 1878.

EXTENDED NOTES ON BREEDING *DEIOPEIA PULCHELLA*.—From the insects mentioned (Entom. xi. 186) I obtained one hundred eggs, only one-third of which hatched; the few I retained were treated in the same manner as the previous brood; they fed exclusively on *Myosotis palustris*, and did extremely well, for by August 20th (twenty-five days from egg) the first larva spun up; three more had done so by August 25th (my other larvæ in different stages were sent to various friends). These four pupæ produced moths on September 10th, 12th, and 16th, two being males and two females. After being together four days, copulation took place, lasting fourteen hours; the female deposited a few eggs each night for a fortnight, and then died. All these eggs were barren.—W. H. TUGWELL; 3, Lewisham Road, Greenwich, October 15, 1878.

PARASITES OF *DICRANURA VINULA*.—On July 31st my brother found a *Dicranura vinula* larva, which he gave to me. The day afterwards I found on it five little black things,

which I thought were smuts. On August 17th I looked at it to feed it, and I found two small green larvæ and three tiny little beetles; the beetles were black, about as big as a speck of dust. When I took them off a transparent liquid flowed out.—S. C. CURTIS; Totteridge House, Totteridge, Herts. August 18, 1878.

ACRONYCTA ALNI LARVA.—Whilst out collecting at Colgrave, on August 3rd, I was lucky enough to find one larva of this rare moth feeding on hawthorn; it has since gone to pupa, and I hope to rear the imago in its season.—W. WATCHORN; Mount Street, Nottingham.

ACRONYCTA STRIGOSA IN WORCESTERSHIRE.—I took two specimens of this *Noctua* in my garden during the past summer. Both specimens were taken at sugar at about a quarter to twelve.—E. C. DOBREE FOX; Castle Morton, Worcestershire.

TAPINOSTOLA BONDII.—This species was bred in 1863 by Mr. Henry Nicholls, who found the larva feeding in the roots of a grass which grows in large tussocks along the Sandgate Road. The grass is *Arrhenatherum avenacerum*. Early in June Mr. Nicholls noticed that in these grass-tussocks some of the stems looked sickly, and by gently pulling them they broke off close down to the roots. A close search disclosed either a larva or a pupa. He collected several of each, and believing them to be *Bondii*, he sent some to the late Mr. Henry Doubleday. From those Mr. Nicholls kept he bred several *T. Bondii* and two *Miana furuncula*, which latter species feeds in much the same manner. Mr. Nicholls gave up collecting some seven years since when his collection and cabinet came into my possession, also his entomological letters, amongst which I find one from the late Mr. H. Doubleday, acknowledging the receipt of the *Bondii* larva. The bred specimens of *Bondii*, with the empty pupa cases pinned beside them, were in the cabinet when it came into my hands, so doubtless any one desiring the larva of *Bondii* may obtain it next year as indicated, but of course it is far easier to get the perfect insect.—W. H. TUGWELL; 3, Lewisham Road, Greenwich.

LEUCANIA EXTRANEA AND L. VITELLINA AT TORQUAY.—I had the good fortune to capture at Torquay, on September 13th, at sugar, a very perfect female *Leucania extranea*, and on the following evening a female *L. vitellina*. On the 16th I found at rest on grass a second specimen of the last-named species.—A. H. JONES; Shrublands, Eltham, Kent, Oct. 1, 1878.

LEUCANIA VITELLINA AT TORQUAY.—On the evening of September 14th, in company with my friend Mr. A. H. Jones, of Eltham, I captured at Torquay a very fine male specimen of *Leucania vitellina*.—R. S. STANDEN; Holmwood Lodge, Surbiton, October 4, 1878.

SERICORIS BIFASCIANA, &c.—I met with *Sericoris bifasciana* in a garden at Mill Hill, Middlesex; it was very common on one particular fir tree; several other trees of the same species did not produce it. *Pædisca oppressana* on trunks of the aspen; *Dichelia Grotiana* beaten from hawthorn hedge, under oaks; and *Coccyx nanana* very common among *Abies excelsa* in the same garden.—R. SOUTH; 277, Camden Road, N.

ARGYROLEPIA MUSSEHLIANA AT DEAL.—Mr. Barrett has identified some Tortrices I captured at Deal last summer as the above-mentioned species. It is certainly strange that this long-lost species should have occurred in two such widely separated localities as Kent and Pembrokeshire. Your readers will recollect that the only locality given by Mr. Stainton in his Manual is Devonshire.—H. VAUGHAN; Bromley, Kent, October 21, 1878.

PTEROPHORUS RHODODACTYLUS AT MILL HILL, MIDDLESEX.—I have found the larva of this species in flowers of dogrose on several hedges in this neighbourhood; one especially good locality is the lane at the back of Buns Farm. I have also found it in the garden on moss roses.—R. SOUTH; 277, Camden Road, N.

CAPTURES NEAR LIVERPOOL—*Colias Edusa*.—In 1877 I took twenty-five *Edusa* and one var. *Helice* in one day. The members of our Entomological Society also had taken or seen many specimens of the same insect, so I think the word plentiful might be applied to their appearance in this neighbourhood in the year 1877. But in the present year not a single *Edusa* has been seen by me, and all who have been afield here assure me they have seen none, nor have they heard of any being seen. *Acherontia Atropos*, another occasional visitor to this neighbourhood, has turned up, and I have throughout this month (October) obtained twenty-six pupæ and one larva, the latter on October 19th; the pupæ are all alive. They were found amongst the potatoes on two farms a few miles out of Liverpool. I was not aware of their visit until many had been destroyed by the potato-gatherers, who called them "stingin' things." The farmer being a friend of mine, I soon got within speaking distance of his

diggers, well knowing what might turn up with the tubers. On showing them an old pupa they recognised it at once, stating they had smashed all they had seen, thinking they were something hurtful. I asked them to preserve them for me, and they have done so, to the advantage of farmer, diggers, and myself. *Arctia caja* was picked up, October 19th, by one of these men, and brought to me alive. Is not this a very unusual time for the imagos of this species?—T. WEST; St. Leonard's Terrace, Ashfield Street, Liverpool.

LEPIDOPTERA IN 1878.—The present season is the very worst I think on record. Some species, like *Nemeobius Lucina* (a common thing), have actually disappeared from localities where they were plentiful in 1877. The same tale of scarcity reaches me from America; and during a fortnight in France I did not see a hundred specimens of all kinds together. *Colias Hyale*, generally so common, was there represented by one. By the bye, I saw a *C. Hyale* at the end of July on the Cotswolds, near Wootton-under-Edge. I also took one *Lycæna Arion* on June 29th, in a stone quarry on Stinchcombe Hill, on the Cotswolds. *L. Alsus* was plentiful at the same time.—A. J. SPILLER; Mangotsfield, Bristol, August 24, 1878.

CAPTURES AT DEAL.—Amongst numerous species I have met with at Deal during the past summer may be mentioned *Lithosia pygmæola*, *Eubolia lineolata* (pretty varieties), *Crambus alpinellus*, *Homæosoma sinuella*, *Nyctegretes achatinella*, *Phycis adornatella* and *P. ornatella*, *Melia anella*, *Euchromia purpurana*, *Sciaphila perterana*, *Catoptria fulvæna*, *Eupæcilia hybridellana* and *E. rupicolana*, *Argyro-lepia subbaumanniana* and *A. Dubrisana*, *Pterophorus parvidactylus* (one very pale example reminds me of *Lætus*), *P. zophodactylus* (Loewii), *P. tephrodactylus*, *P. microdactylus*, and *P. baliodactylus*.—H. VAUGHAN; Bromley, Kent, October 21, 1878.

PARASITES OF *DEPRESSARIA HERACLIELLA*.—On July 30th I was passing a bed of cow parsnep (*Heracleum sphondylium*), and just above the second joint of one of the largest plants I observed two holes. On cutting it down and opening it I found fifteen pupæ of *Depressaria heracliaella*. I opened others and obtained fifty-eight pupæ: from them I bred fourteen moths and thirty-seven ichneumons (*Ichneumon vacillatorius*). Seven pupæ are standing over, but I believe they are infested. *I. vacillatorius* does not make a pupa-case, the metamorphosis taking place within the pupa of its

victim. I also obtained two larvæ which were infested with a species of *Chalcididæ*, the two larvæ producing sixty-three imagoes, these forming pupa-cases or cells within the larvæ.—G. C. BIGNELL; Stonehouse, Plymouth, October 6, 1878.

CLASSIFICATION OF INSECTS.—Having read with interest certain essays from the pen of the late Edward Newman, that have appeared from time to time on the classification of Insecta, may I be allowed to call attention to additional evidence adduceable from the evidence of the higher organs of sensation—sight and hearing? Here the presence of auditory organs and well-developed eyes place the Orthoptera first in the list; these would be followed by Homoptera (*Cicadidæ*), where the auditory organs are highly developed, but sight less potent; next to which appear to come Lepidoptera, where the *Nocturni* have well-defined auditory organs, and the *Diurni* excellent optic organs; then would follow Coleoptera, which certainly give evidence of possessing auditory apparatuses in two groups, *Lamellicornia* and *Longicornia*, although in the latter the visual organs are imperfect. As far as I can learn the species of Hymenoptera, Neuroptera, and Diptera, have the auditory sense, if present, less potent; but sight, smell, and touch are evident. This perfectly harmonizes with the circular view given in the Ent. Mo. Mag. iv. 236.—A. H. SWINTON; Binfield House, Waterden Road, Guildford, October 11, 1878.

APHIDIVOROUS CHARACTER OF THE TELEPHORIDÆ.—I have further confirmed my last season's observations on the Aphidivorous character of the *Telephoridæ*. I have many times seen, *e.g.*, *Rhagonycha melanura* sitting on the flower of a thistle, and on a hasty glance it might seem to be seeking honey like the bees and butterflies; but on closer inspection the insect's head was always found turned to the outside of the calyx, and in every case *Aphides* were there present. In this district the *Telephoridæ* have been much scarcer than usual. This season also I have not seen a single *Byrrhus* along a certain road where, during the summer of 1877, I met with them daily.—J. W. SLATER; 3, Bicester Road, Aylesbury, August 7, 1878.

STRIDULATION OF PELOBIUS HERMANNI AS EXPRESSION OF EMOTION.—I recently put a specimen of *Pelobius Hermannii* in water with a *Ranatra linearis*. The *Ranatra* seized at the beetle but missed it, when the beetle sounded its usual shrill grating note as though under the influence of fear or anger.—A. G. LAKER; Court Hill Road, Lewisham.

DRILUS FLAVESCENS (FEMALE) NEAR ASHFORD.—On Whit-Monday last I picked up an example of the above-mentioned rarity crossing a road on the Chalk Hills. Never having seen a female *Drilus*, but perceiving my captive was a perfect insect, though very larva-like, I forwarded it to Mr. Champion, who kindly determined the species for me. Wishing Mr. Champion to see it alive, I placed it in a jar with a banded snail or two, but it refused to feed, and after a few days laid about two dozen eggs, and died. My example is consequently a poor one. The eggs were not fertile, or I should have tried to learn something of its natural history.—T. H. HART; Kingsworth.

BRACHINUS CREPITANS.—I have observed that the little bombardier beetle has been exceedingly plentiful this year, and I feel interested to know if this has been the experience of others. I caught my first specimen in March, and this was the first I had ever seen here; since then, and till quite lately, they have appeared in great numbers. On the South Downs, near Eastbourne, I also saw several of these insects, though I have no recollection of having observed them there before. Altogether *Brachinus* seems to have been an exception to the general scarcity of his order this year. It is a very sociable insect, and I have seldom seen one without finding others close by. These beetles are very partial to my sugar compound, and have swarmed on trees prepared for moths. *Colias Edusa* has quite disappeared from here this year.—F. G. HOPKINS; Ridgeway, Enfield.

MOWING OPERATIONS OBSTRUCTED BY BEES.—On June 27th last my man was cutting clover with a mowing machine, and hearing that he was continually stopping I proceeded to the spot to enquire into the cause. He informed me that the mower was choked by the quantity of "mouse-nests" that got on the finger-points. I picked up one of the said nests lying near, and to my surprise found it contained not young mice, but a mass of about a dozen pupa-cells of some bee. I then examined all I could find, and with the same result. The nests were beautifully formed of grass-shreddings, with apparently only one opening. From the contents of one nest I reared two perfect insects, which were somewhat larger than the honey-bee, stouter in proportion, and covered with thick gray pubescence. I have no doubt the species is well known to entomologists, but it has not come under my observation before, and consequently excited my curiosity.—T. H. HART; Kingsworth, Ashford, Kent.

[This bee was undoubtedly *Bombus sylvarum*, a very generally distributed species.—ED.]

LEPISMA SACCHARINA.—Will you kindly name the enclosed insect for me? It was found by myself in a chest of China tea, on August 18th.—F. B. STREET.

[The insect forwarded, which was found in the chest of tea, is that well-known little household pest, the common fish-scale (*Lepisma saccharina*). These degraded little insects are especially partial to the contents of the store-room or book-case. They are of nocturnal habits, swiftly running away to some shelter when disturbed by day. Sir John Lubbock from time to time published his "Notes on the *Thysanura*" in the Linnean Society's Transactions: these subsequently developed into that important and beautiful "Monograph of the *Collembola* and *Thysanura*," issued by the Ray Society in 1873.—E. A. F.]

CELERY FLY.—Will you kindly let me know the name of the insect of which the enclosed represent the larva? They have almost destroyed the whole of the leaves of my celery (six rows of ten yards each). My gardener tells me he has seen them some years ago, and that they will not injure the edible part of the plant.—W. H. HEATON.

[These small green maggots, which live in blotches between the cuticle membranes of the celery leaves, are the larvæ of a pretty Dipterous fly belonging to the genus *Trypeta* of Meigen. They blotch the leaves only, and are not injurious to the stalks unless present in extraordinary numbers, or from a very early attack on the young late plants. This year they are, however, especially abundant and destructive in and around London; I know of rows in metropolitan gardens of which the leaves are completely gone, looking as if they had been scorched or burnt up; in such cases they must be injurious to the well-being of the plants. Pinching the larvæ when in the leaf is a sovereign remedy where practicable and attended to. It is also usual to grow celery on almost the same ground year after year; where the insect is troublesome this should be avoided as much as possible.—E. A. F.]

REVIEW.

European Butterflies and Moths. Parts 1 to 7. By W. F. KIRBY. Cassell, Petter & Galpin. 4to. 1878.

THIS work, which is illustrated by coloured plates, is based upon Berge's "*Schmetterlings-Buch*," and is written by our

well-known correspondent Mr. W. F. Kirby, who is assistant naturalist in the Royal Dublin Society's Museum. Being published in monthly parts, at a low price, brings this useful and popularly-written book within the reach of all our readers; we strongly recommend it to the notice of those who have not yet obtained it. The plan of the work is so simple that it will be found most useful to beginners in the study of Lepidoptera, as well as to those of more extended experience, whether they desire a knowledge of the European species, or simply to follow the insular tastes too common to many of our fellow-workers in Britain. To the latter students it will teach what allied species are to be found on the Continent, even within a few miles of our shores. We fear we are correct in saying that many of our oldest British collectors would be puzzled to state off-hand how many species were represented in Europe by the genus of—say for example—*Argynnis*. This insular exclusiveness amongst British Lepidopterists is perhaps not so much the result of any bias, as of the difficulty hitherto found in obtaining a good book upon the subject, printed in English, and within the reach of reasonable means. In supplying such an important desideratum as this, Mr. Kirby has, we believe, taken the first step towards breaking through this prejudice, and it now only requires a fairly good system of interchange of specimens between British and Continental entomologists to make the study of European Lepidoptera as popular amongst our readers as has been that of their native forms. This brings us to the question of the fictitious value set upon certain well-known and even common continental species of Lepidoptera which have been rarely captured in these islands. That this should be so, in the cause of scientific knowledge, is much to be regretted, we think no one can for a moment doubt; one result of this unfortunate and totally fictitious difference in the value being that the majority of English collectors are afraid if they send a rare British form abroad, they thereby lose a chance of enriching their own cabinets and simply waste a valuable "specimen," forgetting that their collection should be ranked rather as a dictionary than a mere monument to their acquisitiveness. As an example of this want of general knowledge of the various European forms of a certain species, may be quoted the introduction and long continuance in our British list of *Dianthecia Barretti*, a species which has been relegated by British Lepidopterists even to a wrong genus. There is

little doubt that other so-called exclusively British moths will eventually prove to be either melanic or other varieties of some previously known European species. We may here remind our readers that many English insects are in great request amongst Continental entomologists, and that purchase is by no means absolutely necessary, although in many cases it is the most convenient way of obtaining examples from localities which are far apart. We cannot forbear again congratulating the author upon striking this, by Englishmen, comparatively unworked vein of literature, for we are sure his work will bear fruit, if only by giving many British Lepidopterists an opportunity of pursuing a new line of thought.

Mr. Kirby has written a very useful introduction to his work, extending to considerable length. This is not an ordinary preface, but a really useful working manual of primary instruction to the would-be Lepidopterist. It is so simply written that the reader is not tired with dry scientific detail. It is further helped by a useful plate of anatomical diagrams of the various parts of a lepidopteron. This will be especially useful to the beginner, who will find not only these details, but also instructions how to collect, set, and arrange his specimens. Besides the coloured plates, showing types of genera, there will be found in the letter-press explicit descriptions of the types and varieties of species, their size, geographical description, food of larvæ, and, best of all for the English reader, well-known British insects are taken for comparison when the insect under description is not known to occur in this country.

The spirited publishers deserve support for the care taken in the production of this work. When we consider that it is issued in very large numbers, the plates are fairly good; and we should feel pleased that we live in an age when such a work can be issued to the public so cheaply.—[J. T. C.]

OBITUARY.

THOMAS W. WONFOR.—This gentleman, whose name has long been familiar to all classes in Brighton, died at his residence, 38, Buckingham Place, Brighton, on Sunday, the 20th October last, in the fifty-first year of his age. Although the deceased had only been seriously ill for some three weeks before his death, his health had been failing him for years past, and he was frequently unable to leave his house for

weeks together. His entry on a public career in Brighton was first made in connection with the Royal Literary and Scientific Institution at the Albion Rooms. Shortly after the formation of the Brighton and Sussex Natural History Society, in 1853, Mr. Wonfor was appointed an Honorary Secretary, a post he continued to fill to the date of his death, and the duties of which he discharged with exceptional ability and energy. At the meetings of this Society, from which he was rarely absent, his extensive knowledge and unfailing good humour rendered him a universal favourite, and his death leaves a vacancy which it will be almost impossible to supply.

The papers communicated by Mr. Wonfor to the 'Proceedings of the Brighton and Sussex Natural History Society' are very numerous, and the excellence of many of them has obtained for their author a more than local reputation.

It was as a microscopist that Mr. Wonfor chiefly distinguished himself, and one of his papers, "On certain Butterfly Scales characteristic of Sex," read at Brighton in November, 1867, was subsequently published in the 8th vol. of the Microscopical Journal, and is alluded to by Mr. Darwin in his 'Descent of Man,' &c. In addition to this may be mentioned his papers, "On the Eggs of *Articulata*," "On the Scales of Insects," &c., &c.

Besides his very numerous papers on microscopical subjects, Mr. Wonfor contributed a great number on Entomology, and nearly every other branch of Zoology, not only to the Proceedings of his own Society, but to 'Scientific Opinion,' 'Science Gossip,' and various other periodicals.

On the occasion of the visit of the British Association to Brighton in 1872, Mr. Wonfor took a very active part in their proceedings, and acted as Secretary to one of the committees.

Although the deceased never attained the position of a distinguished scientific specialist, few men ever possessed so large an amount of general information on scientific matters, or have been more ready to impart it for the benefit of others, than the amiable and accomplished gentleman, who for nearly a quarter of a century has laboured so assiduously for the intellectual improvement of his fellow townsmen.

Mr. Wonfor was appointed Curator of the Free Library and Museum in 1875; he was elected a Fellow of the Linnean Society in June, 1877, and a member of the Entomological Society of London in February last.—H. Goss.

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THE LARVA OF *CHIRONOMUS PLUMOSUS* (BLOODWORM).

By EDWARD COX.



Fig. 1.—*CHIRONOMUS PLUMOSUS*: magnified 4 diams.

ALL the figures of this larva that I have seen are alike; and they are evidently taken from Réaumur's 'Memoires,' which were published about 140 years ago. When I noticed that Réaumur's figure had only 10, or perhaps 11, segments, instead of 13, I thought it might be incorrect in other respects. So I obtained some living specimens, and kept them in small glass vessels.

Having closely watched and carefully examined many of these specimens, I find that Réaumur's figure, and the copies of it in Kirby and Spence's 'Introduction,' Burmeister's 'Manual,' &c., are, as I suspected, inaccurate.

This larva has four prolegs (fig. 1); the pair on the second segment have their ends fringed with closely placed hairs, and are not unlike the prolegs of caterpillars. The other pair, which are on the last segment, have each fifteen (?) brown



Fig. 2.—Magnified 50 diams.

claws. These claws are unequally bidentate plates with incurved teeth; they differ in size and shape (fig. 2), and

are attached by one end to a central spot at the end of the leg, where they stand with their shorter convex edges next to the foot, the teeth being directed outwards; and together they form a radiate tuft which can be retracted by the muscular axis of the proleg. I know that these prolegs have been termed "air-tubes," and "respiratory organs;" even the anterior pair are called "air-tubes" by Burmeister; but, without considering their structure, the way in which they are used as organs of prehension and locomotion ought, I think, to convince any observer that they are really prolegs. Besides, this larva keeps always under water, never coming to the surface for air; consequently, air-tubes would be useless. There are four egg-shaped appendages at the extremity of the abdomen, the upper two of which are larger than the others. There are only three in Réaumur's figure, and these are equal and cylindric. Near each end of the penultimate segment are two fleshy indistinctly jointed worm-like filaments,—these are not well represented by Réaumur.

The larva has four eyes, two on each side of the head; two strong, toothed mandibles, with other oral organs, and, no doubt, a spinning apparatus; for it collects any small pieces of dirt which come in its way, and fastens them together by threads, and so makes an irregular tube, in which, holding by its prolegs, it waves its body up and down, thus producing a current which brings it food, and at the same time a fresh supply of water to its branchiæ. Sometimes it will come out, when, holding by its anal prolegs to any slight web it may have made, it will search for food, its jaws working incessantly and its head moving up and down, while it twists itself about in all directions with restless activity. Occasionally it will remain comparatively quiet, resting on its anterior prolegs, then reminding one of a pig with its feet in the trough, groping for a *bonne bouche*. It generally remains concealed, and only when disturbed, or when seeking a fresh resting-place, is it seen swimming about with that peculiar writhing motion which everybody has observed. There are a few scattered hairs about the head and thoracic segments, and two scanty tufts on a protuberance on the top of the anal segment.

The pupa of this insect also has been incorrectly represented. In the figures that are copied from Réaumur the abdomen has a segment more than it should have; the branchial tufts on the thorax are too symmetrical, and the hairs too scanty; the wing-cases are not of the right shape, and the tubes which contain the legs of the coming gnat are not shown.

These, when the pupa is *ripe*, lie between the undeveloped wings, extend a little beyond them, and then curve backwards (fig. 3). The imago of this, and probably of some allied species also, emerges from the pupa-case with surprising celerity. This wonderful transformation is performed in less time than a man takes to change his coat. When the pupa comes to the surface of the water, the skin of the thorax parts, the head and shoulders of the gnat appear, and it comes forth steadily as though some one were squeezing it out. In fifteen seconds it is free, and flies away! Fig. 3.—Mag. 5 diams.



172, Acre Lane, Brixton, S.W.

NOTES ON CERTAIN SILK-PRODUCING BOMBYCES.

By ALFRED WAILLY.

(Membre-Lauréat de la Société d'Acclimatation de France.)

As many English entomologists now take an interest in European and Exotic Lepidoptera, I send you some notes on silk-producing Bombyces which have been bred in this country during the year 1878:—

SILK-PRODUCING BOMBYCES WITH CLOSED COCOONS.

Attacus Yama-Maï (Japanese oak-silkworm).—This species, reared in Britain for several years with very little success, is in the egg state during the winter. The moths, which pair with difficulty in confinement, lay their eggs in August and September. About a fortnight after the eggs have been deposited, if fertile, they contain a larva which remains in the egg till the end of April or beginning of May (according to temperature), before it makes its appearance. In warmer countries the young larvæ hatch earlier. The eggs of *Yama-Maï* must be kept in the open air protected from the rain and the rays of the sun. In case they should hatch before the oak leaves or buds should be sufficiently advanced to feed the young larvæ, small oak trees should be potted, and protected from the frost during the winter, but the trees

should never be forced in a hot-house. When the young worms have hatched they can at once be placed on the young trees, and they will seldom wander. When larger, the worms must be placed on oak branches (plunged in water), one or two feet long. Small twigs must not be used, still less cut leaves, to feed the worms. Branches should be cut in the evening; never while the sun is shining on them. If these rules be observed, failure in the rearing of the larvæ will be avoided to a great extent.

For the rearing of young larvæ I have adopted with great success the following plan:—I have large bell glasses (with four or five openings on the dome) placed on saucers full of sand covered with a piece of paper. Small branches are stuck through the paper into the sand, and no water is required to keep the foliage fresh under the glass, which, of course, must not be put in the sun. The larvæ will there thrive till they are large enough to be placed on branches plunged in water. When necessary, the glass may be raised, so as to give free ventilation; as to the droppings, they can be removed by merely blowing on the paper. If the glasses be large enough, a certain number of the larvæ may be left under them, till they form their cocoons, although it is preferable to rear them uncovered when large. When under glass, as no water is required to keep them fresh, the branches may be short, and cut according to the size of the glass, but when plunged in water they must always be long; otherwise the foliage would get watery and cause the death of the larvæ. *Yama-Mai* worms should not be placed in the open air till June. They want shade and to be freely watered in hot weather. Ova of this species should always be obtained as early as possible, so that they should pass the winter in the locality where they are to be reared. This plan for rearing the *Yama-Mai* may be adopted for all the species of silk-producing and other large Bombyces.

Attacus Pernyi (Chinese oak-silkworm).—This species, a native of North China, is very easy to rear in the open air, and will feed, like *Yama-Mai*, on all species of oak. Being double-brooded, and a second rearing being extremely difficult, if not impossible, the cocoons obtained should be kept in the open air and in a cool place, so as to prevent the moths from emerging in the autumn. In spite of precautions, when the autumn is mild, some of the moths will emerge, but the majority of the cocoons will keep till May of the following season.

The young worms of *A. Pernyi* hatch in June or beginning of July, when there is an abundance of foliage to feed them. Besides this advantage over *Yama-Maï* it has another—the great facility with which it is reproduced, the moths always pairing in whatever place they may be. The cocoon is larger than that of *Yama-Maï*.

Attacus Polyphemus (*Telea Polyphemus*) from North America.—This most valuable insect, which produces a closed cocoon like the two preceding species, is polyphagous, thriving well on willow, birch, oak, nut, chestnut, beech, elm, &c. This species must be considered as single-brooded. It is so in Illinois and Michigan, at least when the larvæ are reared in the open air.

Several of my correspondents who, this year, bred *A. Polyphemus*, having obtained the moths in the autumn, it must be stated that the cocoons were kept in rooms, which should not be done if they are to be preserved till May of the following year, when the moths begin to make their appearance. It must also be borne in mind that many species of Lepidoptera which are single-brooded in northern countries may become double-brooded if bred in captivity or in warmer countries.

A. Polyphemus can be reared in the open air in this country. At the end of last July, previous to a journey I made to Paris, I left a few *Polyphemus* larvæ on small trees in my garden, nut, willow, and birch. On my return to London in September, I was much pleased to see fine cocoons on the trees, although the quality of the foliage was not good.

The larva of *A. Polyphemus* is most magnificent. In its last stage it is covered with forty-eight silver and eight gold metallic spots, the latter being on the first two segments. When the sun shines on the larva, which is of a fine green with small pink spines, it seems covered with diamonds.

The fine and strong silk of *Attacus Yama-Maï*, *A. Pernyi*, and *A. Polyphemus* could be seen at the Paris Exhibition. The silk of *Yama-Maï* is light green, *Pernyi* light brown, and *Polyphemus* white. Besides the three species mentioned, there are several others which produce closed cocoons, but as they have not, as yet, been bred in this country, no mention will be made of them.

(To be continued.)

RAMBLES AFTER RARITIES: LONDON AND
LYNDHURST, 1875.

By BERNARD LOCKYER.

PERHAPS, even should the greater lights on Entomology fail to find interest in the accompanying stray leaves from the diary of my last season's collecting, some of the lesser ones may not disdain to peruse them for the sake of such hints, as I can afford them, from the result of four years' experience in the New Forest.

At the beginning of the season I had but little in hand, save a few larvæ of *Mania maura* and *Noctua rhomboidea*, which for the sake of making their acquaintance, preparatory, as I hoped, to taking them in their native haunts, I had kept feeding on a pabulum, much esteemed by hybernating *Noctuæ*—viz. carrots—through the winter. *Taniocampa miniosa* put in an appearance in my breeding cages in March, from larvæ collected at Lyndhurst the previous season.

On March 25th I packed up my collecting traps and went to Lyndhurst. Luckily the weather proved fine, but things were hardly forward enough for very successful operations in the entomological way. A delightful spring walk through the locality for *Leucophasia sinapis*—an enclosed plantation of young firs and oak, intersected, as is the case with all the newer enclosures, by very broad flowery rides (the haunt of *Hyria Auroraria*, *Acosmetia caliginosa*, &c.), and known to those initiated in the Government Survey maps as Park Hill Enclosure—only produced a few dozen of the pretty young larvæ of *Thera variata*, and a few of the, at that time, anything but attractive ones of *Ellopia fasciaria*. I think few would imagine that the really gaily-coloured full-fed larva of this insect had started in life so pachydermatous and ugly in general appearance.

Full of expectations of plenty of work amongst the spring-feeding *Noctuæ* larvæ I wended my way in the evening to the shades of the Hurst Hill Enclosure,—a wood to the west of the Brockenhurst Road, composed of oaks and horse-chestnuts about seventy years old, with an undergrowth of wild rose, sloe, hawthorn, and bramble, with here and there a clump of birch; the ground in summer carpeted by *Polypodium* and various weeds, and intersected by a most annoying number of wide ditches overgrown with similar

plants. The wood is well situated for collecting, being between two heathy tracts of undulating country, till lately well supplied with birch copses, and surrounded by some of the finest old oak and beech woods in the forest,—such as Whitley (oak) Wood, between it and the Brockenhurst Road, and Gritnam (beech) Wood, between it and the Christchurch Road to the north-west (a locality for *Sarrothripa Revayana*). There is, moreover, an enclosure to the east opening out of it abounding in old fir trees (New Park Enclosure), and a farmyard at one corner. It was here in August, 1874, that I took varieties of *Cidaria immanata* at sugar, quite equal to those from Scotland; besides dozens of *Noctua rhomboidea*, and specimens of *Triphæna interjecta*, *Agrotis puta*, *Cerigo cytherea*, &c. Having sugared I took to larvæ hunting, expecting at least a few good things; but though I could hear the young creatures falling off their food-plants as I shone the light on them, I could not secure anything better than a minute individual, which I made out to be *Noctua brunnea*. This sort of thing, carried on till 10 p.m., grew rather back- if not heart-breaking; so after a round at sugar, which produced a few nice *Tæniocampa munda* and some common hybernated *Noctuæ*, I retired.

Next morning I made up my mind to a long stroll, and full of determination started for the confines of the forest. I passed through what seemed to promise to be glorious collecting ground, lying to the east of the Christchurch Road; and a most muddy ramble I had. I tried a little oak-beating about Rhinefield Sandys, where in 1874 one had but to tap the twigs to fill one's umbrella with such larvæ as *Diphthera Orion*, *Boarmia roboraria*, *B. consortaria*, *Eurymene dolabraria*, *Notodonta dodonæa*, *Tephrosia exter-saria*, &c.; but none of the expected *Roboraria* gladdened my eyes. This is the last and largest enclosure between Hurst Hill and the main road; and at Welperley, an extensive wood seven miles from Lyndhurst, I added to my store of *Thera variata* to the extent of three only. After crossing the rails near Holmsley with some difficulty, owing to the slipperiness of the ground, and tramping laboriously through two miles of woodland path by Wootton Copse Enclosure, I reached home *viâ* Set Thorns and Aldridge Hill, not too late to take another turn at sugar, whereat my only notable capture was one *Tæniocampa munda*.

Next day, after hard work in Park Hill Enclosure, I came back the richer by one *Ellopia fasciaria* and a few *Thera*

variata, and a solitary young *Boarmia roboraria* knocked off a young oak. Variety is charming, so I bethought me that I would change my field of operations, and in the evening I struck out for Pondhead Enclosure, on the other side of the Brockenhurst Road, and one of the favoured haunts of the graceful *Limenitis sibylla*. But I had little better luck here: the evening was chill, and my captures at sugar were one *Tæniocampa instabilis* and two *T. munda*. As to larvæ they eluded my search by the same gymnastic feat as before; and on reaching home I found my captures were confined to *Triphæna fimbria* and *Noctua triangulum*. Slightly disappointed the next day found me back in London.

April I devoted to hard night-work at Highgate and Hampstead, being anxious to verify my suspicions concerning some larvæ I took there first in 1872, and which I set down as *Triphæna janthina* and *Noctua baja*. I found larvæ commoner than usual. Between April 1st and June 16th I spent sixteen nights at this work: the result of my operations was about four hundred and fifty larvæ. In the spring (at Highgate especially) *Noctua brunnea* predominated; seventy-eight fell to my share. Next followed *Boarmia repandata*, which is most conspicuous from its pale colour, sticking out with arched back from the bramble twigs; but of this I only took thirty-two. Of *Noctua triangulum*, *N. festiva*, and *Aplecta nebulosa*, I took about two dozen each. Then followed *Triphæna orbona*, *T. janthina*, *Noctua augur* and *N. baja*, which were severally represented by about a dozen specimens. *Triphæna fimbria* was very rare near London; but at Lyndhurst in May it turned out *en masse* to greet me, and I could have taken hundreds, but contented myself with fifty-three. I also picked up stray larvæ of *Odonestis potatoaria*, *Leucania lithargyria*, *Miana strigilis*, and *Urapteryx sambucaria*. As I have already noted I captured in June about a gross of *Xylophasia scolopacina*, along with which I took the pretty larvæ of *Larentia didymata* (on grass, well under large clumps of undergrowth), *Tæniocampa gothica*, *T. cruda*, and *Cosmia trapezina*.

I may as well add here that I found that the usual colour of larvæ of *Noctua brunnea* may be better described as dull rosy red, not reddish brown. Pale and ochreous varieties run very near to *Noctua baja*, but may be separated by the position of the pale spot on the subdorsal line, which in

Noctua brunnea is in the centre of the segment, and in *N. baja* near the hinder end of it, and by the markings on the heads. *Noctua festiva* I find I described as ferruginous, in error. All those I took at large between 1872 and 1875 were either a peculiar tint of olivaceous ochreous, more or less clouded over with a dull pinkish, and with the hinder part of each segment appearing as an ill-defined, transverse, delicate rosy band, or else dirty ochreous or grayish ochreous; often with all the triangular marks pale raw-sienna brown. *Triphæna janthina* and *Noctua augur* are especially attached to hawthorn and sloe: the former (at Highgate, at any rate) has a lateral stripe of a delicate rosy tint, and is altogether a very translucent looking creature. I think it is rather odd that though the larva of *Noctua triangulum* occurs every season at Highgate I never took the imago at sugar or on the wing.

19, Burghley Road, Highgate Road, August, 1878.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTE ON THE RARITY OF *COLIAS EDUSA* IN 1878.—During the present year I have seen but two specimens of *Colias Edusa*—one in June in the New Forest, and the other I took on October 15th near Lewes, apparently but just emerged from the chrysalis. Mr. J. H. A. Jenner, of Lewes, saw but one during the year; this was seen near the spot where I captured mine, but ten days later, viz. on October 25th.—J. JENNER WEIR; 6, Haddo Villas, Blackheath, S.E.

ABSENCE OF *COLIAS EDUSA* IN 1878.—I have not seen a single specimen of this species this year, though last year the insect absolutely swarmed in the neighbourhood of Guildford and for miles round; the variety *Helice* also occurred, and I myself took one. Although *Colias Edusa* was so abundant that year, I did not see any specimens of *Colias Hyale*.—G. W. OLDFIELD; Weybank House, Guildford, November 4, 1878.

NOTES FROM HARWICH, 1878.—*Colias Edusa*.—The only specimen seen and captured here was a freshly emerged male on the 18th of August. Last year it was the most common butterfly here. *Acherontia Atropos*.—A fine specimen was caught on the 18th May. This autumn there has been a large number of larvæ and pupæ taken. *Liparis salicis*.—On the morning of the 27th June last thousands of these

moths appeared, having come over the sea. I was informed that they arrived at the break of day, and resembled a fall of snow—they were so numerous. They were also observed many miles at sea. On the day of their arrival they might be seen by hundreds at rest on the buildings facing the sea. I secured many fine specimens.—F. KERRY, Harwich.

CHÆROCAMPA CELERIO AT BRIGHTON.—I procured on October 4th the larva of the silver-striped hawk-moth (*Chærocampa celerio*); it was found in a garden at Brighton. It appears nearly full fed, and no doubt will turn in a few days. Being a very rare species, more especially in the larval state, I have much pleasure in recording its capture.—C. BRAZENOR; 39, Lewes Road, Brighton, October 5, 1878.

DEILEPHILA LIVORNICA IN GLAMORGANSHIRE.—A specimen of *Deilephila livornica* was captured at Merthyr-mawr, Bridgend, during the third week in August. It was in good condition, and was found on the dining-room window attracted by the light.—G. F. HAMPSON; Exeter College, Oxford.

NOTES ON *BOMBYX QUERCUS*.—I have often been at a loss to account for the great mortality amongst the larvæ of this species. From a partiality to the larvæ and imago, I have generally collected as many as came in my way when out, but I never yet succeeded in bringing more than a small percentage of them to the perfect state. Whether this has been from lack of any special treatment I am anxious to learn, and probably these notes may call forth a few from others who have had similar experience with this species. During the present year I collected seven larvæ of *B. quercus* in different stages of growth, which fed well, and to all appearances maintained perfect health; they constructed cocoons, and I awaited their emergence, but not one moth came out. A few evenings ago I cut the cocoons open; four of them contained dried-up larvæ; the other three had partially undergone metamorphosis; none of them had been ichneumonised. Again, on referring to my entomological diary, I find on May 15th, 1870, I collected eight larvæ; these all fed well and duly spun cocoons, but no imago emerged. In 1871 I took four larvæ, but obtained no imago; in 1873 twelve larvæ spun, but I got no imago from them; in 1876 they were unusually abundant and early, when between April 2nd and May 14th I obtained forty-five larvæ, the majority of which spun cocoons, the first on May 24th, and the last on July 9th; the first pair of imago emerged on July 4th, another pair on the

8th, a female on the 10th, and another on the 12th, which, on being treated with oxalic acid, readily deposited a quantity of eggs, which to my surprise produced larvæ a few days afterwards. I had no males at the time in or near the cage. I am aware that this is not unusual with some species of *Lepidoptera*, but this is the first time it has come under my own notice. A similar case of parthenogenesis relative to this species is noticed by Mr. C. O. Groom Napier in the volume of 'Science Gossip' for 1868, p. 71. He says, in writing of this species, "One year I had many virgin females, some of which laid fertile eggs." I should be glad of any information which might lead to more successful rearing. I may remark that all my larvæ were fed indoors separate from other species, always being in reach of a plentiful supply of fresh hawthorn. It would be interesting to know whether this mortality is peculiar to this species in a state of nature.—R. LADDIMAN; Norwich.

SUGAR versus HONEY-DEW.—I have often heard friends complain of their sugaring expeditions being unsuccessful, and attribute failure to the counter-influence of honey-dew; but I cannot quite bring myself to believe that this is the true cause of non-success. During the seasons of 1875 and 1876 I had good opportunities of observing the result of honey-dew attraction as against that of sugar. The scene of my operations was a garden and orchard bordered by large oaks, elms, and aspens: on the trunks of these and a few fruit trees I spread my bait. Four plum trees of low bushy growth stood in about the centre of the garden: these were covered with a fine crop of *Aphides*, instead of plums; the leaves twisted and curled, presenting altogether a very dejected appearance in the day-time. The following table will show the relative merits of the artificial and natural attractions:—

JULY 9 TO AUG. 28, 1875.

	Sugar.	Honey-dew.
<i>Cosmia diffinis</i> .	76	11
<i>Noctua rubi</i> .	68	5
<i>Cosmia pyralina</i> .	60	7
<i>Caradrina blanda</i> .	54	43
<i>Cosmia affinis</i> .	42	16
<i>Mania maura</i> .	34	3
<i>Cerigo Cytherea</i> .	32	0
<i>Caradrina Alsines</i> .	14	6
<i>Tethea subtusa</i> .	0	4
„ <i>retusa</i> .	0	1

JULY 14 TO AUG. 15, 1876.

	Sugar.	Honey-dew.
<i>Caradrina blanda</i> .	40	27
<i>Cosmia diffinis</i> .	37	6
<i>Cerigo Cytherea</i> .	24	0
<i>Cosmia pyralina</i> .	17	9
<i>Caradrina Alsines</i> .	13	3
<i>Cosmia affinis</i> .	8	2
<i>Tethea subtusa</i> .	2	14
„ <i>retusa</i> .	0	4
<i>Tryphæna interjecta</i> .	0	2

A large number of commoner species visited the sugar, but very few the honey-dew; two or three *Geometra* showed preference for the latter; and *Herminia tarsipennalis*, *Pyrallis fimbrialis* and *P. glaucinalis* were common on the former. On the whole the balance of species and individuals was decidedly in favour of sugar. On several nights visitors to my feast were scarce; but at that prepared for them by the *Aphides* they were even more so. On these occasions the invited must have had important engagements, which prevented their attendance at the rival banquets; and so passed on their invitations to certain earwigs and slugs, for these gentry were present in large numbers. I am inclined to think the condition of the atmosphere is the chief point upon which depends the result of our sugaring; but what that condition should be I am unable to say. In the month of August, 1876, I sugared almost every night; and I took a few notes as to the state of atmosphere, wind, direction and force, thermometer readings, moonlight, &c., but have been unable to go into the matter since. Next year I hope to do so, and shall be glad of any suggestions on the subject.—R. SOUTH; 277, Camden Road, N.

IS PERICALLIA SYRINGARIA DOUBLE-BROODED? — Upon referring to Newman's 'British Moths,' and some other entomological works, I find the above question answered in the negative, which is quite in accordance with my experience previous to this season. However, from the facts stated below, I now hesitate in giving that opinion. This year I took the first moth of the species mentioned upon July 4th, and saw the last on the 13th of the same month: from females taken I obtained four broods of larvæ, some of which were hatched on July 19th. A little later in the month I observed that something had commenced to feed upon a lilac; but unfortunately I omitted to search for the intruders until August 16th, when a larva nearly full fed was taken; the imago appearing on August 30th. Later on another search was made, which resulted in finding a pupa; the perfect insect in this instance emerged September 5th. I may add that these two moths are of a different shade to any others I have taken, a point which is quite in harmony with the second brood of other species in this group. Thus I am led to suppose that these caterpillars were hatched at the same time as mine, and consequently have produced a second brood. Can any of the readers of the 'Entomologist' kindly inform me if in breeding *Pericallia syringaria* they

have ever obtained a second brood?—H. T. DOBSON, jun.; New Malden, Surrey.

[Kaltenbach ('Pflanzenfeinde,' p. 437) gives this species as double-brooded, but that it is not normally so in Britain the following instances will show, although it occasionally occurs twice in the year. The most striking case is that of Colonel Stewart's, who, in 1864, had about twenty-five larvæ, which were all hatched within twenty-four hours; one only of these progressed rapidly, and emerged at the end of September, the rest hybernating as larvæ (Entom. ii. 102). Mr. Elisha also records an instance of part of a brood feeding up rapidly, the imagos appearing in August, whilst the remainder hybernated as larvæ (Entom. v. 170). This abnormal autumnal appearance of the imagos is again corroborated (Entom. vi. 13) by the Rev. Bernard Smith.—E. A. F.]

CLEORA VIDUARIA.—*Cleora viduaria* seems to have unaccountably disappeared from the New Forest, formerly its chief locality. Six years ago, about the end of July or beginning of August, Mr. George Gulliver, of Brockenhurst, saw a number of females in a worn condition sitting on the tree trunks. A few days afterwards he could find none, and has not seen a specimen from that time to this. I have seen none myself when I have been in the Forest; and as far as I can learn the disappearance is complete. The disappearance of *Orgyia cænosa* from Wicken Fen is explained in the September number of the 'Entomologist' (Entom. xi. 212), by the fact that the fen was flooded in 1875 and 1876; the moth, moreover, is again appearing in its old locality. There seems, however, no reason to be given for the disappearance of *C. viduaria*; and the unusual gathering of females above mentioned makes the fact still more strange. *C. glabraria* is to be found in the plantations around Brockenhurst in fair numbers at the beginning of August.—[Rev.] W. W. FOWLER; Repton, Burton-on-Trent.

APOSTEGA SPATULELLA IN ESSEX.—While looking over some insects, captured by me during this summer in South-east Essex, Mr. Sidney Webb kindly pointed out a specimen of *Opostega spatulella*. This species has hitherto, I believe, only been recorded from Devonshire and from North Essex.—JOHN T. CARRINGTON; Royal Aquarium, Westminster, S.W., November, 1878.

DIASEMIA RAMBURIALIS AND PIONEA MARGARITALIS AT FOLKESTONE.—I had the good fortune to take one specimen each of the above species near Folkestone, the former in the

beginning of October and the latter in July.—W. PURDEY; 132, Dover Road, Folkestone.

BRITISH HYMENOPTERA.—Among other less common *Hymenoptera*, I have taken here this year, *Myrmicisa Latreillii*, female and male, and one male of *Stenamma Westwoodii*.—E. CAPRON, M.D., Shere, near Guildford, October 15, 1878.

LIBELLULIDÆ IN LONDON.—During the first week in last September I observed on more than one occasion several dragon-flies sporting in the sunshine about mid-day, in Oxford Street.—R. T. GIBBONS; Cecilyne House, Cavendish Road, Brondesbury, N.W.

PARASITE OF SPHINX LIGUSTRI.—I have this summer bred three fine specimens of *Trogus lutorius* from three pupæ of *Sphinx ligustri*. The metamorphosis took place within the doomed pupa. On examining the pupæ after the parasites had emerged I found each of them about half-filled with thick creamy-looking matter, but no indication of a parasitic pupa-case.—G. C. BIGNELL; Stonehouse, Plymouth, November 6, 1878.

FURTHER NOTES ON ACRIDA VIRIDISSIMA.—Whilst staying by the sea last August, at Pendower Castle, on the east coast of Cornwall, I had ample opportunity of watching the habits of this species of Orthoptera, which abounded everywhere in the neighbourhood. I could not, however, discover satisfactorily what they do in the daytime, but I think the males spend it in a semi-dormant condition, whilst the females are engaged in procuring food. Such, at least, was the case with a pair I kept alive for some time. As the night closes in, the males crawl up the stalks of thistles, &c., taking their position generally with their heads downwards, preparatory to their nocturnal concert. Then the music begins, and all the hedges and fields for a mile round seem really to "burst" with the noise, causing the trees to almost tremble with the echo cast upon them from the surrounding hills. After sugaring, the sound used to be ringing in my ears for hours. This peculiar noise is produced by rubbing together two hard spots at the base of the elytra, and is intensely shrill and piercing. They are very bold whilst thus engaged, allowing one to get hold of the bush in which they are situated, dodging round the stalk if threatened by the hand. I have no knowledge of the female making any sound at all. When caught these insects are very ferocious, and will bite one's hand with vigour. So angry, indeed, was one

specimen that, while a young lady was teasing it when held in my hand by the leaping-legs, it actually jumped right off its legs in order to get at her, leaving them "kicking" in my hand; which circumstance much disconcerted the tormentor. Vegetable matter is, I think, generally considered to be the food of all grasshoppers; but my observations in one case showed me a very different state of things: of a pair that I kept alive in a gauze cage the female used to spend the whole of the day trying to catch small grasshoppers, which seemed to hold her in great terror. I have repeatedly seen her catch them and devour a part of them, nearly always breaking their necks first; and then she would, as a rule, drop them in a certain place, and then go after others. Is cannibalism usual with these insects? The male I observed eating the seeds of a dock plant that was growing within the cage. One male greedily drank some drops of moth-sugar that were spilt on a window-sill. They are not good hoppers, but can run fast, which is their usual method of locomotion. They are by no means such powerful hoppers as their congener *Clypeata*. This species, from what I have noticed, seems to have a decidedly maritime taste.—H. HODGE; 33, Almorah Road, Islington, N., October 14, 1878.

NEUROTERUS LÆVIUSCULUS.—During the present autumn the scarce oak-spangle gall of *Neuroterus læviusculus* has been remarkably plentiful in some districts; and having been so recently noticed as an English gall (Entom. x. 122) it would be of interest if some of our gall observers would mention how far north its spread (or its presence, this year) has been observed. In the neighbourhood of Isleworth it has been sufficiently plentiful for me to be able with a little search to secure specimens whenever they were needed. In West Gloucestershire, and about a mile west of Chepstow (Mon.), I found it on October 5th in great numbers on oak, cut back into low bushes in the hedge of a wood in a somewhat damp locality, where the infested sprays overhung or were close to a neglected ditch. The galls were remarkably good specimens, both as to development and the peculiar faint salmon-tint characteristic of this species; and on some larger leaves in a sheltered spot in one of the deep sunk Gloucestershire lanes hard by I found as many as four hundred on the back of more than one oak leaf, this number far exceeding any quantity of this gall that I have met with before on a single leaf. Around Maldon, Mr. Fitch writes me he has observed the galls of *N. læviusculus* in such numbers this year as

almost to take the place of those of *N. lenticularis*; and in the other localities I have named, the common oak-spangle gall has also been unusually absent. The fact of the oak leaves not being, as in some recent seasons, so overloaded with the common spangles as to leave little chance of growth to the more delicate species, is enough to account for a larger number of those, both of *N. leviusculus* and *N. fumi-pennis*, being observable this year; but in itself the small number of *N. lenticularis* which has been observable this autumn in some of its favourite haunts, whilst at the same time it has been remarkably plentiful in others, is of some degree of interest.—E. A. ÖRMEROD; Dunster Lodge, near Isleworth, November 12, 1878.

HAGGERSTON ENTOMOLOGICAL SOCIETY, ANNUAL EXHIBITION.—The annual exhibition of insects took place on the 21st and 22nd of November, as usual, in the rooms of the Society, Brownlow Street. Although not so large as some of the former Exhibitions there were many interesting insects there. Amongst them was a series of the Lepidopteron recently added to the British list, *Tinea Orientalis* (Stainton), bred from horns by Mr. Simmons, who had also in the same case many beautiful *Cucullia gnaphalii*. Mr. Meek showed eight cases of Lepidoptera from Rannoch, the North and South-west of Ireland, Howth, and the fens of Norfolk and Cambridge, all in beautiful condition. Mr. Weston, a case of Lepidoptera, including *Hydrilla palustris*, *Leucania extranea*, and a curious *Lycæna Adonis*. Mr. Eedle had several educational cases of a highly interesting character, showing the metamorphoses of insects; also a box of fine varieties of well-known Lepidoptera. Mr. Sidney Webb showed a remarkable box of white and silvery forms of British butterflies and moths. Amongst other varieties were a beautifully-marked pale form of *Abraxas grossulariata*, taken by Mr. Priest in Kent (this specimen was the admired above all others in the Exhibition); two *Vanessa cardui*, exhibited by Mr. J. A. Clark; a pair of odd-sided *Smerinthus tiliæ*, by Mr. Pratt; and a curious series of *Abraxas grossulariata* from a second brood, reared by Mr. H. Bartlett. Lepidoptera, as usual, was by far the best represented order; but other orders were exhibited by Messrs. Eedle, Hillman, and Vanderburgh. A large number of visitors were present on each evening.—ED.

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WITH THE ASSISTANCE OF

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"I venture to think the evidence now brought forward, however imperfectly, is at least sufficient to justify the conclusion that there is not a hair or a line, not a spot or a colour, for which there is not a reason,—which has not a purpose or a meaning in the economy of nature."—SIR JOHN LUBBOCK.

"A very tyrant is the rain;
He throweth around his chilly chain,
He barreth the rich, and he barreth the poor,
While his sentinels pace at every door."

T. BUCHANAN READ.

"Roads are wet where'er one wendeth,
And with rain the thistle bendeth,
And the brook cries like a child!
Not a rainbow shines to cheer us;
Ah! the sun comes never near us,
And the heavens look dark and wild."

MARY HOWITT. (*From the German.*)

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HYBERNATION OF BRITISH BUTTERFLIES.

By EDWARD A. FITCH.

ABOUT a month ago I received a note from Miss R. M. Sotheby enquiring how *Satyrus Egeria* passed the winter. Not having bred the species, but believing that all our British *Satyridae* hybernated in the larval state, I answered accordingly. However, this was followed by the information that one *S. Egeria* was already a pupa (Entom. xi., 251), and two more have since turned. This, together with the uncertainty regarding that most uncertain species, *Colias Edusa*, led me to consult what authorities I have at hand as to the hybernation of our British species of *Diurni*. The result of the enquiry may, I think, be interesting to many readers of the 'Entomologist,' and the perusal of the list will, I hope, lead to further information. I say this because uncertainty still surrounds the state of hybernation of four of our very commonest butterflies, viz., *Satyrus Megæra*, *Chortobius Pamphilus*, *Polyommatus Phlæas*, and *Lycæna Alexis*.

Apropos of *C. Edusa*, I may say that, although I have this year 109 acres of clovers, trefoils, and lucerne on my farm, this errant species has altogether failed to put in an appearance, much to my disappointment. What can have become of it?

The hybernation of a species is strictly constant. We know that from locality, climate, or other cause, a species may have one, two, three, or perhaps more broods in the year; still it always passes the winter in the same state. In other cases we may have what may be called premature broods or individuals. By these I mean the abnormally early maturity of some specimens; for instance, a certain larva, even from the same batch of eggs, will occasionally feed away from its brethren, and appear as

an imago in the autumn, while the normal habit of the species is to hibernate in pupa or even in larva, as the case may be. Again, when many individuals pupate together it sometimes happens that some are perfected prematurely in autumn, the rest passing the winter in their penultimate state. Such specimens are, I believe, invariably infertile, and play no part in the continuation of their species. Hence they appear and die, but in no way affect the constancy of the hibernation. Newman treated this subject so clearly that I may be excused for copying his words:—"It is a most interesting fact, and one that cannot be too strongly impressed on the memory, that all the individuals composing one kind, or more properly one 'species' of butterfly, always hibernate in the same state: each adheres strictly to the practice of its species; that is to say, that if one peacock butterfly passes the winter season in the butterfly state, so will its children pass the next winter in the same state, and its children's children the next following winter in the same state, and so on for countless generations." (Brit. But., p. 16).

The following is the list of our British species, with the state in which each passes the winter according to our present knowledge. It will be found to differ considerably from the list in Newman's 'British Butterflies':—

<i>Papilio Machaon</i> . Pupa.	<i>Vanessa Antiopa</i> . Imago.
<i>Leucophasia sinapis</i> . Pupa.	<i>V. Io</i> . Imago.
<i>Pieris crastægi</i> . Larva.	<i>V. Atalanta</i> . Imago.
<i>P. brassicæ</i> . Pupa.	<i>V. cardui</i> . Imago.
<i>P. rapæ</i> . Pupa.	<i>Limenitis Sibylla</i> . Larva.
<i>P. napi</i> . Pupa.	<i>Apatura Iris</i> . Larva.
<i>P. Daplidice</i> . Pupa.	<i>Arge Galathea</i> . Larva.
<i>Anthocharis cardamines</i> . Pupa.	<i>Erebia Epiphron</i> . Larva.
<i>Gonepteryx rhamni</i> . Imago.	<i>E. Medea</i> (Æthiops). Larva.
<i>Colias Edusa</i> . ? Larva.	<i>Satyrus Egeria</i> . ? Larva.
<i>C. Hyale</i> . ? Larva.	<i>S. Megæra</i> . ? Larva.
<i>Argynnis Paphia</i> . Larva.	<i>S. Semele</i> . Larva.
<i>A. Aglaia</i> . Larva.	<i>S. Janira</i> . Larva.
<i>A. Adippe</i> . Larva.	<i>S. Tithonus</i> . Larva.
<i>A. Lathonia</i> . Larva.	<i>S. Hyperanthus</i> . Larva.
<i>A. Euphrosyne</i> . Larva.	<i>Chortolaus Davus</i> (Tiphon). Larva.
<i>A. Selene</i> . Larva.	<i>C. Pamphilus</i> . ? Larva.
<i>Melitæa Artemis</i> (Aurinia). Larva.	<i>Thecla rubi</i> . Pupa. (Buckler, Bar-
<i>M. Cinxia</i> . Larva.	rett.)
<i>M. Athalia</i> . Larva.	<i>T. quercus</i> . Egg.
<i>Vanessa Calbum</i> . Imago.	<i>T. W-album</i> . Egg.
<i>V. urticae</i> . Imago.	<i>T. pruni</i> . Egg.
<i>V. Polychlorus</i> . Imago.	<i>T. betulae</i> . Egg.

Polyommatus Hippothoë. ? Larva.	Lycæna Arion. ? Larva.
P. Phlæas. ? Larva (Moncreaff).	Nemeobius Lucina. Pupa.
[Lycæna Bæticus. ? Egg.]	Syriethus alveolus (Malvæ). Pupa
L. Ægon. Egg.	(Hellins, Zeller).
L. Agestis (Medon). Larva (Zeller).	Thanaos Tages. Larva.
L. Alexis (Icarus). ? Larva.	Hesperia Paniscus (Palæmon).
L. Adonis (Bellargus). Larva. (Hel-	? Larva.
lins).	H. Sylvanus. Larva. (Mühlig, Zel-
L. Corydon. Larva.	ler).
L. Acis (Semiargus). Unknown.	H. comma. ? Larva.
L. Alsus (Minimus). Larva. (Hel-	H. linea (Thaumas). Larva.
lins).	H. Actæon. Larva. (Buckler, Zel-
L. Argiolus. Pupa (Buckler).	ler.)

An analysis of this shows that certainly five species and doubtfully one hibernate in the egg; twenty-eight and doubtfully eleven in the larva; eleven in the pupa; and eight in the imago; whilst the state in which one (*Lycæna Acis*) passes the winter is altogether unknown.

Pieris cratægi departs from the habits of its congeners by hibernating gregariously as a larva.

Colias Edusa and *C. Hyale*.—The information as to hibernation in these two closely allied species is involved. See Entom. xi., 60, 139.

Satyris Egeria.—In the first record of the life-history of this species Newman says that it hibernates in the penultimate or pupa state, but this is altered (? corrected) in 'British Butterflies,' on what authority or for what reason we are not told. At Entom. iii., 217, we have—"The larvæ are full fed by the end of September. . . . Early in October the larva spins a slight silken covering on a stalk, stem, or blade of grass, and, suspending itself therefrom by the anal claspers, is changed to an obese pupa. . . . In this state it remains throughout the winter, the butterfly appearing on the wing from the 10th to the 20th of the following April." At Brit. But., p. 86, we have—"The caterpillars hibernate early, and are full fed by the end of the following March." From present information the earlier account appears to be correct.

S. Megæra.—Two or three continental authors say this species 'über-wintert' as a pupa. This agrees with the present idea as to its near ally. The genus *Pararge* includes *P. Mæra*, *P. Hiera*, *P. Megæra*, *P. Egeria*, &c. Professor Zeller says that in 1875, in the Albula Pass, he found *P. Hiera* as early as 24th May, and

remarks that the snow was only just then melting, so that the larva must have changed under the snow and the imago have been rapidly developed, or, '*differing from Megæra*,' the penultimate state was reached in the autumn. (Stett. Ent. Zeit. xxxviii., 307).

Chortobius Pamphilus.—Von Prittwitz says this species hibernates in the egg (see E. M. M. vi., 223). Newman says in the larva. Which is correct?

Thecla quercus.—With respect to this species the Rev. J. Hellins very pertinently asks the following (E. M. M. xiv., 112):—"The saw leaf would before long have fallen from the bush and decayed; and if the larva is not hatched till the spring, what meanwhile becomes of the egg?"

Polyommatus Phleas.—The only authority I can find for the hibernation of this very common species is Mr. Moncreaff's note at Entom. iii., 41.

Lycæna Agestis (Medon).—Newman says 'egg,' but it is given as 'larva' on Professor Zeller's authority (Isis, 1840 and E. M. M. iv., 74).

L. Alexis (Icarus).—Kaltenbach says this species hibernates, like many of its congeners, as a larva ('Pflanzen-feinde,' p. 109). Newman gives it as doing so in the egg. There ought to be no question about so common a butterfly.

Hesperia comma.—Rev. J. Hellins says (E. M. M. vi., 222) that this species deposits its eggs in August, and they are not hatched till the following March or April.

Maldon, Essex, November 11, 1878.

LIFE-HISTORIES OF SAWFLIES.

Translated from the Dutch of Dr. S. C. SNEELLEN VAN VOLLENHOVEN.

By J. W. MAY.

(Continued from vol. xi., p. 247.)

LOPHYRUS VIRENS, Klug.

Klug, *Die Blattwespen in Magazin der Naturforschenden Freunden zu Berlin*, 1816, p. 38.

Hartig, *Blatt und Holzwespen*, p. 119, No. 2, pl. 2, f. 6.

Ratzeburg, *Die Forstinsecten*, D. III., p. 114, Pl. 2, f. 5.

Lophyrus sem. luteo, viridi et nigro variegatus, alarum stigmatate et costa flavis, tibiarum posteriorum spina latissima;

mas. niger, ventre rufo, clypeo et prothorace supra flavis.
Long 8 mm. Exp. alarum 17 mm.

On the occasion of the annual excursion of the Society, on the 2nd of July, 1871, I took for the first time some larvæ of *Lophyrus virens*, Klug, from which I was fortunate enough to rear the perfect insect.

The larvæ were found for the most part on the ends of the hanging branches on the shady side of an avenue of little pine trees, or, properly speaking, of a rather wide path through a pine wood. It was not till near the end of the excursion that I found the first examples, so that I was only able to take a small number. The pine trees on which the larvæ were found were of the common species, *Pinus sylvestris*; the larvæ occurred at some distance from each other, and not associated in numbers as is usually the case with the *Lophyri*. Judging by the considerable distance at which one larva was found from another (I seldom saw two on one tree), I conclude that the eggs are laid separately. My larvæ were very nearly full-grown, and had but one more moult to undergo. The largest were twenty-eight millimetres long, the colour being grass-green, striped longitudinally with white (see fig. 1). The head is not circular in outline as in the well-known *Lophyrus Pini*, but elliptical (see fig. 2); it is shining pale grass-green, and has a black chevron descending from the vertex to the round black spots in which the eyes are placed; the chevron is thinner at the upper angle than towards the ends of the sides. The labrum and mandibles are brown, the latter with black tips. There is a broad dorsal line along the body of a grass-green colour, somewhat darker at the sides; this line is often a little darker towards the middle also. Next to this, on either side, is a broad sea-green stripe with many transverse folds; next to this a narrow dark green stripe, and then a grass-green one, in which are placed the very small orange-coloured stigmata; this again is bordered by a line of raised folds, quite white, below which are the legs, pale green and twenty-two in number. The horny prolegs have exceedingly fine black longitudinal stripes on the upper side (see fig. 2). According to Hartig certain variations are to be observed in this species as regards the markings on the head. In some examples the chevron above the eyes does not extend to the apex; in others this mark not

only reaches below the round eye-spots, but, in addition, a transverse band is observed between the eyes, crossing the clypeus. Hartig is wrong in saying that the body is entirely smooth, without spines; with a good lens minute spines are distinctly visible.

For the purpose of moulting, my larvæ placed themselves round three or four fir needles, to which the old skin was afterwards attached. I am sorry I had not time to make a drawing shewing the manner of this operation. Immediately after the moult the larva, which was now much shorter and thicker, was of a pale grass-green tint, with the exception of the labrum, which was brown, and also of the black eye-spots. Subsequently the head acquired an olive tint, and the legs, together with the projecting dermal folds above them, were obscure yellowish white (fig. 3).

In somewhat less than a week's time after this moult the larvæ began to make their cocoons, some on the needles of the fir twigs, others against the sides of the box in which they were kept. The cocoon (fig. 4) was reddish white, and had some fine pilose brown wrinkled lines; it was of the usual form of the cocoons of this genus, but appeared to me to be a little more elliptical than that of *Pini*.

With me the imago appeared in August, which is contrary to Hartig's experience, with whom they only made their appearance in May of the following year; however, on this point he is not very clear. His own words, which seem to me not very explicit, are as follows:—

“Die Verpupping geschah im Zwinger, in der Mitte des Monat Juli, die Wespen schwärmten in der Mitte Juni des folgenden Jahres also nach beinahe jähriger Larvenruhe. Aus überwinterten Cocons schwärmten die Wespen Mitte Mai.”

The sexes differ greatly from each other; the female is much variegated, the male being of a very sober tint. Fig. 5 represents the female of the natural size; fig. 6 the same sex magnified and with the wings expanded; fig. 7 the male. The sexes are, moreover, distinguished by the antennæ, which in the female are serrate-dentate on the inner side, and in the male are doubly pectinated, having twenty teeth gradually decreasing in length. The following is a description of the two sexes:—*Female*, length 8.0 mm., expanding 17 or 18 mm.; body short and thick, being

broadest at the middle of the abdomen; colours black and yellow or greenish yellow; the head, which is very broad, is greenish yellow, with a broad black transverse band along the forehead and encircling the eyes: this band is unequal and serrate above and below. The antennæ are as long as the head is broad; the first two joints are yellow with the upper border black—these are without teeth; the third joint is yellow at the base, and further black; all the remaining joints are black; the third has a rather long tooth or pectination on the under side; the fourth has a somewhat longer tooth, but the following all gradually decrease in length towards the tip of the antenna. The mandibles are of a brown tint, the palpi yellow. The posterior border of the head, where it touches the thorax, is black.

The prothorax is entirely pure yellow; the mesothorax has the anterior lobe black with a greenish yellow margin; the lateral lobes are black with an obtuse triangle of a yellow tint next to the insertion of the wings. The squamulæ and the scutellum are obscure yellow, with the posterior border black; the metathorax is entirely black. The mesopectus is yellow, with black sutures and a large pectoral spot. The wings are transparent sordid white, with yellow costa, the nervures being partly yellow and partly brown.

The abdomen is essentially green-yellow; the posterior margins of the segments are, however, shining black, broadest toward the middle of the dorsum, so much so that the two anterior segments shew but little yellow at the sides, and only on the fifth does a narrow line of yellow extend across the whole dorsum, while the eighth segment is almost entirely of this colour. On the ventral surface the abdomen displays more yellow, and at the anus is a conspicuous marking of yellow with black spots.

The legs are for the most part yellow, the bases of the coxæ being black, and a line on the under side of the femora, a broad ring at the apex of the tibiæ, and the posterior margin of all the tarsal joints pale brown or grey. In the female as well as in the male the tarsal joints are much expanded on the inner side and are at the same time furnished with patellæ, the inner spine on the posterior tibiæ being, in the female, expanded so as to form a somewhat broad oval plate.

The male is, as a rule, rather smaller, the coloration being black, slightly diversified with yellow; of this colour are the

extreme margin of the clypeus, the labrum, palpi, and the point of the collar. With the exception of the first, all the segments of the abdomen are red at the sides and on the ventral surface, this colour increasing in extent towards the apex. The legs are brownish yellow, the coxæ and apophyses being black; the four anterior femora are black at the bases; the two posterior legs, the bases of the femora, and the apex of the tibiæ are fuscous, and the margins of the tarsal joints brown. The wings have the anterior margin transparent white, not yellow as in the other sex, and the margins of the stigma brown; the nervures are brown or bright yellow. *Lophyrus virens* has been observed in this country (the Netherlands) by M. Six near Utrecht, by M. Brants near Borculo, and by the writer near Breda, and, if I remember rightly, near Brummen also. This species is very scarce with us, and seems to be so in other countries likewise, so that it cannot be considered as one of the insects injurious to the pine.

17, Finsbury Circus, E.C.

NOTES ON CERTAIN SILK-PRODUCING BOMBYCES.

BY ALFRED WAILLY,

Member Lauréat de la Société d'Acclimatation de France.

(Concluded from vol. xi., p. 265.)

SILK-PRODUCING BOMBYCES WITH OPEN COCOONS.

Of these, four species will be mentioned, which have been bred in England, France, and Germany.

Attacus Cynthia; *Attacus Promethea*; *Attacus Cecropia*; *Attacus Atlas*.—These four species in America go under the generic name of *Samia*. *Cecropia* and *Promethea* also go under the generic name of *Hyalophora* in America. The larvæ of these four species all have the same form and appearance, and the imagines the same designs on the wings. The moths can all be taken with the hand and will readily hold to anything—while those of the three species first mentioned, especially *Yama-Mai* cannot be held in the hand; the least touch causes them to drop heavily down, and make half a dozen somersaults before they keep quiet. *Pernyi*, however, is not so wild as *Yama-Mai*. *Attacus Mylitta* (from India), also has the same habits as *Yama-Mai*. *Selené* (from India).—Although belonging to another

genus, has also the habit of dropping down when touched, but it will often adhere to the finger.

Attacus Cynthia (*Samia Cynthia*).—A species acclimatized in France and in the United States of America. Easy to rear in the open air on the ailanthus trees. Will feed also, but not so well, on the laburnum, lilac, and cherry. Double-brooded. Moths will often emerge in the autumn, especially if the rearing of the larvæ has taken place early. *A. Cynthia* is a native of North China; the moths pair as readily as those of *Attacus Pernyi*, and emerge about the end of June.

Attacus Prometheus (*Samia Prometheus*), from North America.—The cocoon of this species is very similar to that of *Cynthia*, but smaller. The moths do not pair very easily; the larvæ are rather difficult to rear. Perhaps the proper food-plant has not yet been discovered. The larva in England and on the Continent of Europe has been fed on lilac and cherry. In America, it feeds on the *Laurus sassafras* and *Laurus Benzoin*. The male and female moths differ very much in colour, the male being of a velvety black, the female brown.

Attacus Cecropia (*Samia Cecropia*) from North America.—This species is extremely polyphagous, eating almost any kind of foliage: fruit trees, especially plum and apple; also willow (all species), poplar, maple, &c. I received in December, 1877, an extraordinary number of live cocoons of *Cecropia* from America (5500). It has been bred extensively this year in England, France, Belgium, Germany, Austria, and Portugal. I let go from my garden a large quantity of impregnated females, and also took a quantity to a wood near London. Have some of them established themselves in this country? that is the question.

Attacus Atlas (*Samia Atlas*—*Saturnia Atlas*) from India, China, &c.—Food plants: apple, plum, peach, barberry, &c. Of this remarkable species, I could only obtain one brood (pairing), the moths having commenced to emerge only a few days before my leaving London for Paris, at the end of July. The ova I obtained (180) all turned out fertile. Most of the larvæ obtained were bred in France, and some in England. A friend of mine in the country succeeded in rearing all the larvæ (excepting a few, which had escaped) in a hot-house, on the barberry. The larvæ formed their cocoons about a month after their exit from the ova—an extraordinarily short time. I saw the cocoons, which were rather

small, the larvæ very likely having been forced too much. The result of the rearings of *Atlas* in France, which I do not know yet, will be stated in the 'Bulletins de la Société d'Acclimatation de Paris.' I had *Atlas* cocoons of two different races; the ova were obtained from the smaller race, which, I was told, came from Bangalore. Early in 1877, I had obtained a few cocoons of a giant race of *Atlas*, which, with similar cocoons I brought from Paris (empty cocoons), happen to be a race from the Himalaya Mountains. These cocoons did not produce a single moth in the summer of 1877, and some of the pupæ died. But this last summer, in July, I obtained a few moths far more brilliant in colour than the moths obtained from the other cocoons. Two specimens, male and female, are now exhibited, and may be seen in the Insectorium at the Royal Westminster Aquarium, London. The female of this giant race is nearly eleven inches wide from tip to tip of the wings, and is of extreme beauty.

Actias Selene (from India).—This year I succeeded in obtaining four pairs of this magnificent species from cocoons sent from India, June 1st, June 21st, July 4th, and July 5th. I obtained over twelve hundred fertile ova; the first female laid three hundred and fifty ova; the second, two hundred and ninety-six; the third and fourth, about three hundred each. So far as I am aware, the larva of *Actias Selene* was unknown in Europe till I introduced it this year. It has been bred this year in England, France, and Germany. From reports sent by different correspondents I heard that many of the larvæ had died in the last stage. The larvæ which I bred on walnut branches until I left London did remarkably well under one of my large bell-glasses till they were nearly full-grown, none having died, when I had to entrust a friend with the rearing of them. Unfortunately, with twenty-four larvæ, he could only obtain two cocoons, which produced two small male moths in September. *Actias Selene* feeds very well on walnut, and also on willow and cherry. This species is essentially a "*polyvoltine* race," as we say in French, or "many-brooded." The moths began to emerge on the 28th February, and continued to do so till the 8th July, when all the moths had ceased to emerge from the cocoons (thirty-eight in number). This long lapse of time from the appearance of the first moth, on the 28th February, till the appearance of the last two on the 8th July, shows the great

difficulty I had in obtaining ova of this species; and if I had not kept a good number of cocoons, in all probability I should have been unable to obtain fertile ova. Besides the species mentioned, I obtained fertile ova of *Saturnia Pyri*, *S. Spini*, *S. Carpini*; also *Aglia Tau*, and others; but of these latter I only bred a few *Aglia Tau*.

110, Clapham Road, London, S.W., Nov. 12, 1878.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in the Dublin Museum of Science and Art.

No. XI. NYMPHALIDÆ—NYMPHALINÆ.

Insects allied to VANESSA (concluded) and to ERGOLIS.

OUR next genus is *Kallima*, one of the most remarkable of the *Nymphalidæ*, from the extraordinary resemblance of the under surface of the insect to a dead leaf. The Indian species are nearly four inches in expanse, bluish or purplish above, with a small transparent spot in the middle of the fore wings, beyond which a broad orange band (in *K. Paralekta* and *Inachis*) or a bluish white band (in *K. Philarchus*) runs obliquely from the middle of the costa nearly to the hinder angle. The fore wings are more or less pointed, and the anal angle of the hind wings is produced into a short tail. The under surface is brown, with a dark streak resembling a midrib running from the tip of the fore wings to the tail of the hind wings. The butterfly sits with its wings over its back, its head and antennæ raised and hidden; and the tails, resting on the branch, which represent the stalk of the leaf. Irregular streaks and mottlings render the resemblance still more perfect; and we can readily believe Mr. Wallace (whose description and figures in his book on the Malay Archipelago may be consulted with advantage), when he says that the butterfly cannot be detected when at rest, from its resemblance to a dead leaf. The African species, *K. Rumia*, is smaller, with the tip and anal angle less produced, nor does the under side (which is marked with two small eyes on the hind wings, as in the following genus) present so close a resemblance to a dead leaf. The upper side is brown; the male with a broad oblique pinkish band on the fore wings, and a shorter orange stripe nearer the tip. The female

is brown, with a narrower and shorter oblique white or buff band on the fore wings, and some white spots beyond ; and with a broad buff band on the outer half of the hind wings, marked towards the anal angle with a black eye with a white pupil.

The East Indian species of *Doleschallia* expand about three inches, and are heavy-looking fulvous butterflies, either with broad black borders (*D. Australis*) or with the tip broadly black, and marked with a short oblique fulvous stripe, sometimes followed by a spot (*D. Bisaltide* and *Polibete*). The under side is varied with different shades of reddish brown, and a dark leaf-stalk shade resembling that of *Kallima* runs from the middle of the costa of the fore wings to the short tail on the hind wings. Outside this, on the hind wings, are two dark eyes with black and blue pupils and yellow rings, which are sometimes represented by black dots above ; towards the inner margin of the fore wings are some indistinct eyes. The African *D. Cymodoce* is brown, blue at the base, with a large eye near the anal angle of the hind wings both above and below. The little *D. Eurodoce*, from Madagascar, more resembles a species of *Precis* in size and colour, though in shape it agrees with the other species of *Doleschallia*, except that the tip of the fore wings is rather more hooked and the tail of the hind wings longer. It is dark brown, with a curved fulvous band on the fore wings running from the costa beyond the cell to the inner margin, a little before the anal angle ; the outer third of the hind wings is fulvous, with two dark submarginal waved lines. The under side is brown, varied with tawny ; the space beyond the dark midrib (which is much lighter on the hind wings) is marked by a row of inconspicuous white dots, evidently representing a row of eyes.

The next genus, *Anartia*, contains four South American species closely resembling *Vanessa* in appearance and habits. They generally expand about two inches, and the wings are slightly dentated and angulated, and the hind wings have a slight projection at the outer angle, which makes them appear more or less square. *A. Jatrophae* is buff, with more or less conspicuous brown lines, and is more or less suffused with brown towards the base, and with brown and yellowish towards the margins. *A. Amalthea* is dark brown, with a broad scarlet band on all the wings, commencing with two broken stripes in the cell of the fore wings. There is an oblique band of connected white spots beyond

the cell on the fore wings, and some smaller spots nearer the tip; and a submarginal row of white spots, gradually shading into red ones, on the hind wings. These species are both abundant throughout tropical America; the others are more local and rarer. *A. Fatima*, from Central America, has a yellow band of moderate width running from the middle of the costa of the fore wings to the middle of the hind wings, where it ceases suddenly, though it is followed by a detached yellow spot. Within it is a row of about four red spots on the hind wings, and there are some yellow spots towards the tip of the fore wings. *A. Lytræa*, from the West Indies, is brown, with an indented dull orange marginal line, and an eye with a black pupil in a dull orange ring at the anal angle of all the wings, above which is a white stripe, divided by the nervures, and broader on the hind wings than on the fore wings, running from the costa.

The genus *Eurytela* is of moderate size, the species expanding less than two inches. The wings are rather broad, and the hind margin of the fore wings is generally more or less excavated below the tip; the hind wings are rounded and scalloped. The few species are either African or Malayan, and are generally dark-coloured. *E. Dryope* has a broad submarginal orange band, running from the inner margin of the hind wings, towards the tip of the fore wings, before reaching which it narrows and disappears. *E. Hiarbas* has a similar but narrower white band, which is much farther from the hind margin, especially on the hind wings. Several other African species have a broad white band on the hind wings, and another, interrupted and broken into spots, on the fore wings, which gives them considerable resemblance to some species of *Neptis*, for which genus they might easily be mistaken. One of the Malayan species, *E. Castelnawi*, is of a brilliant blue above.

The genus *Ergolis* is closely allied to this, and is nearly of the same size and shape, but the fore wings are broader and shorter. All the species have a conspicuous white spot on the costa near the tip, but sometimes only on the under side. The African *E. Enotrea* is brown, with many indistinct zigzag transverse lines, and with the whole centre of the hind wings and a great part of the fore wings beyond the cell crossed by a broad but very ill-defined bluish grey band. *E. Ariadne*, a common but very variable East Indian species, is dull tawny above, crossed by many

zigzag brown lines; *E. Taniata*, from the Philippines, is reddish brown, with a submarginal orange band, and *E. Obscura* from Gilolo, which expands over two inches, and is the largest of the genus, is brown above, with one zigzag dark line on the middle of the fore wings, and two on the hind wings. The under side of the hind wings of most species of *Ergolis* is rich brown, with more or less distinct darker bands.

Hypanis Ilithyia is a handsome black and orange butterfly, common in Africa and the East Indies; it expands about one inch and a half. A broad orange band runs from the inner margin of the hind wings to the costa of the fore wings, but is broadly interrupted nearly opposite to the end of the cell, which is partly filled up, and bordered below by a broad orange basal stripe, deeply indented above and below, and connected with the central band; there is also a row of submarginal orange lunules. The under side of the hind wings somewhat resembles that of a *McIltea*. They are banded with different shades of orange, yellow, buff, or whitish; towards the base the bands are edged by rows of black spots, but beyond the middle they are edged by black lines, and the nervures being also black on the outer half, the pale bands are broken into spots. The arrangement and width of the bands of the under surface, and the extent of the orange markings on the upper surface differ considerably, and it is not at all improbable that some of the supposed varieties (several of which have received names) may be really distinct species.

NOTES ON HYMENOPTERA.

By EDWARD CAPRON, M.D.

IN the November 'Entomologist' for 1878 (Entom. xi. 242), I recorded a new *Crabro*. I now am able from the examination of my summer captures in this neighbourhood to announce two interesting additions to our native Ichneumonidae, of which I append descriptions:—

Phygadeuon digitatus, Grav. (fem.).—Long. $3\frac{1}{2}$ lines; alæ expans., 6 lines. Black; mandibles red in middle. Antennæ with joints 8–13, white. Legs red, with coxæ and trochanters black; posterior tarsi, and apex of posterior tibiæ rather darker. Seventh segment of abdomen with a whitish membranous patch.

Aculeus rather longer than half the length of abdomen. Hab. Shere, Surrey.

Stibeutes Heinemannii, Först.—Long. $1\frac{1}{2}$ lines (fem.). Black; antennæ with joints 2—5 and sometimes 1 also reddish yellow. Wings longer than metathorax with distinct stigma; legs reddish yellow. Abdomen nut-brown, with apical segments darker. Aculeus as long as first segment of abdomen, which latter has no lateral projecting tubercles. Hab. Shere, Surrey.

The former conspicuous insect cannot be mistaken for any of its allies. The latter was kindly identified for me by Mr. J. B. Bridgman of Norwich, from Förster's monograph of the *Pezomachi*.

Though I believe a very indifferent season for Entomology generally, the last summer afforded me, as well as the three new species above mentioned, several that are not usually met with among the Ichneumons, Bracons, and Oxyura, and is a proof how much remains to be done among these much-neglected and extensive families.

Chiefly among the larger species I may note the occurrence of *Ichneumon bipunctorius*, Steph. This handsome insect, I believe, exists in few cabinets, and does not appear to be known among foreign authors. I also obtained two specimens of *Clistopyga incitator*, and one of the singular *Foenus jaculator* (*Evaniidæ*), which I took on the flowers of *Pastinaca*.

In the OXYURA group the *Diapriidæ* gave me *Galesus clypeatus*, *Aneurhyncus ruficornis* and *galesiformis*, and numerous species of *Paramesius* and *Diapria*. The *Proctotrypidæ* afforded me eleven species, and I obtained examples of *Perisemus triareolatus* and *Goniozus claripennis* among the *Bethylidæ*. I believe the late Mr. F. Walker had never met with the latter species. I think British Entomology would benefit considerably if a little more attention was paid to these most beautiful and abundant insects, and that our catalogue of Hymenoptera would be rapidly increased. In some future paper I purpose to offer a few remarks on killing and setting the smaller species satisfactorily, which at first seems difficult and deterring to the beginner. Another difficulty no doubt exists in the want of suitable works, but besides those recently mentioned by Mr. E. A. Fitch, the excellent monographs of Holmgren's can now be obtained at a reasonable cost from several booksellers, and, by communication

with others who are already conversant with the leading types, sufficient knowledge is soon gained to enable anyone to associate together the allied genera and species.

Shere, Surrey, December 2, 1878.

ENTOMOLOGICAL NOTES, CAPTURES, &c

NEW BRITISH SPECIES IN THE PHYCIDÆ.—I have much pleasure in recording the capture of a new British *Euzophera*, which I identified, by examination of the foreign collection in the British Museum, as *Euzophera oblitella* of Zeller. The following is a description of the one I captured:—Front wings greyish, dusted with darker, both lines black, the first preceded, the second followed, by a pale band; nearly midway between the two, is a conspicuous black spot; near the base, and almost touching the costa, is another black spot; hind wings pearly grey, gradually darkening to the hind margin. The specimen is in beautiful condition, and was taken on the south-west coast of the Isle of Wight in the autumn of 1876. I have not identified it until lately. There is only one specimen in the British Museum collection. In Staudinger's Catalogue, Germany, Hungary, South-East Russia, Mid-France, Andalusia, and Sicily, are recorded as localities.—J. B. BLACKBURN, B.A.; care of Rev. J. Buckmaster, The Vicarage, Wandsworth, November 19, 1878.

ELACHISTA MONTICOLELLA, A SPECIES NEW TO BRITAIN.—When at Witherslack in August, 1872, I took several specimens of an *Elachista* that I thought distinct from *E. Kilmunella*. I sent them to Mr. Stainton, along with my series of *E. Kilmunella*, and called his attention to them. He replied, "Get more; try and find the larva; I think you have a good new species." A short time ago I sent some specimens of the same moth, and he returned them named as above, coupled with the remark, "It is probably Edleston's '*Alpinella*.'" Very oddly, when Mr. Sang was staying with me this summer, these specimens were overhauled, and he, Mr. Sang, said he had found an *Elachista* larva he did not know, which when bred proved to be this species; and simultaneously with this information came word from Mr. Warren that he had also turned up the same species.—J. B. HODGKINSON; 15, Spring Bank, Preston, December 11, 1878.

ABSENCE OF *COLIAS EDUSA* IN IRELAND IN 1878.—I have not seen a single clouded yellow this year, although I have hunted for it at Greystones and Bray Head (one of its favourite resorts), co. Wicklow, at Howth near Dublin, and at Glengarriff and Queenstown, co. Cork. If this has been the case with regard to *Colias Edusa*, the contrary may be said of *Vanessa cardui*, which as far as my experience goes was the commonest butterfly this summer. I counted over thirty specimens of her ladyship in a clover field at Bray Head. From accounts published, *Acherontia Atropos* seems to have been taken this year in tolerable abundance. In addition to the one chronicled by me (Entom. xi. 160) I know of three others which were caught respectively at Schull, about August 25th; near Glengarriff, October 4th; and at Bantry, early in the same month.—WILLIAM W. FLEMYNG; 18, Upper Fitzwilliam Street, Dublin; November 8, 1878.

NOTES FROM GUERNSEY.—The following species must be added to the list of Guernsey Macro-Lepidoptera:—*Deiopeia pulchella*: a fine specimen was captured on the coast near Petit Bo Bay, by Mr. Frederick Heume, and I have had the pleasure of seeing it in his collection. *Leucania straminea*: I took two on July 10th, on a marshy piece of ground, called the Grande Mare, near Vazon Bay. *Aporophyla australis*: I bred two rather small specimens from larvæ found during spring on the sandy north coast of the island. The imago emerged on September 29th and 30th. *Hecatera serena*: I found one at rest on a wall, whilst searching for *Bryophila glandifera*. Lepidoptera, generally, have not been nearly so plentiful this season as last, and sugaring, although repeatedly tried under seemingly favourable circumstances, has been of very little use. In places where *Lithosia rubricollis* was abundant in former years, I have only found two or three specimens, and I have not succeeded in finding a single larva. *Colias Edusa*, which was so plentiful here last season, has been scarcer than usual; and I have only been able to find one *Eubolia peribolata* instead of the usual one or two dozen.—W. A. LUFF; Guernsey, November 15, 1878.

DESCRIPTION OF THE LARVA OF *SPILODES PALEALIS*.—The larvæ from which the following description was taken were sent to me the last week in August 1876, by the Rev. P. H. Jennings, M.A., of Longfield Rectory, Gravesend. He had found them in

that district feeding on the umbels and flowers of *Daucus Carota*. Length when at rest about three-quarters of an inch, when crawling about an inch. Body stout and cylindrical, the segmental divisions well marked; head polished, the lobes globular, and there is a plate of the same polished appearance on the second segment; the skin has a soft appearance and is sparingly clothed with short hairs. Ground colour of the dorsal surface dull dingy green; head and plate yellowish green, conspicuously marbled with intense black; dorsal stripe dark green, broad except at the segmental divisions; tubercles raised, large and brightly polished, intense black encircled with yellow; spiracular region yellow—on its upper edge is a row of black tubercles, similar to, but smaller than those on the dorsal region; spiracles very small but distinct, also black. Ventral surface yellowish white, legs and tubercles intense black; prolegs also tipped with black on the outside. One larva had the ground colour of the dorsal surface purple, the dorsal stripe darker purple, and the black tubercles encircled with pinkish; the spiracular region also pinkish.—GEO. T. PORRITT; Highroyd House, Huddersfield, November 7, 1878.

CAPTURES NEAR MORPETH.—*Deilephila livornica*: On August 5th of this year, I received a living specimen of *D. livornica* from Mr. Schofield, Secretary to the Morpeth Mechanics' Institution Field Club. The insect was taken near Hartburn, at rest on a fence, about three o'clock in the afternoon on the above date, and it appears to have been a considerable time on the wing, for the colour is faded and the wings are a little worn. I also got from Mr. Schofield on September 17th, a larva of *Acherontia Atropos*, but unfortunately it died. I heard that several more were destroyed in the neighbourhood of Morpeth through the ignorance of the people who found them. In 1877 *Colias Edusa* was generally diffused over this neighbourhood, but not abundant; the first insect that I saw was on June 4th, and I took a very fine *Helice* on the 7th. All the *Edusa* that were seen from June 4th up to the first week in July were females; no more were seen from the first week in July until September 2nd, when male and female appeared in about equal numbers, and continued on the wing until the second week in October. I have not seen or heard of any one who has seen a single specimen of *C. Edusa* this year.

I have a specimen of *Vanessa Antiopa* which was taken in this neighbourhood on August 20th, 1876.—JOHN FINLAY; Meldon Park Gardens, Morpeth, November 13, 1878.

CAPTURES NEAR HARTLEPOOL.—*Deilephila livornica*: a specimen of this insect was brought me in July by a lad, who caught it on the town moor. It is rubbed by being carried in his hands, but had evidently been very fine when obtained. The only other occurrence of this rarity in this district that I know of, is a specimen recorded in 1858 by Mr. E. Backhouse as being taken at Sunderland "many years ago." *Sphinx convolvuli*: a fine specimen of this insect was picked up on the sands near Seaton Carew, in October. Yellow varieties of *Zygæna filipendulæ*; three specimens of this variety have been obtained here this summer. Beginners, to whom the commonest species are desiderata, have best success with such as these. One of these was bred and another taken by a beginner, the third was taken by a lad and given to me.—JOHN E. ROBSON; Bellerby Terrace, Hartlepool, West.

LEUCANIA EXTRANEA IN CORNWALL.—On looking over a few insects taken by a schoolboy friend, I noticed a specimen of this rarity. On enquiry, I learnt that he had been spending a week in Cornwall, during August last, and that this insect had been taken from a sugared thistle-head. He also captured several common species of *Noctua* from the same heads, which he found very attractive. The specimen, which is a female and rather worn, is now in my collection.—WALTER P. WESTON; 1, Duncan Terrace, N., November, 1878.

HYDRILLA PALUSTRIS.—I have succeeded in adding to my collection a specimen of this rarity, which was captured at Wicken Fen this year, where I am informed several others were taken.—ID.

ANCHOCELIS LUNOSA HYBERNATES AS A LARVA.—There appears to be some confusion as to how the four species of *Anchocelis* hibernate. The eggs of *A. rufina* are said to hatch in the spring (Bryant, Entom. vi. 127), as also are those of *A. pistacina* (Crewe, Zool. 6384). The Rev. P. H. Jennings has recorded (Entom. vii. 287) that the larvæ of *A. litura* emerged the first week in October from eggs laid on September 23rd, while Mr. Buckler in his life

history of this species (E. M. M. ix. 39) states that the eggs laid early in October did not hatch till the middle of April. This autumn a female *A. lunosa* laid me a quantity of eggs on September 21st; these hatched on October 18th, and the larvæ are now doing fairly well on grass.—EDWARD A. FITCH; Maldon, Essex, November 19, 1878.

IDENTITY OF *EPHIPPIPHORA OBSCURANA* (Steph.) AND *E. GALLICOLANA* (Zell.).—Upon reading my former article on the identity of these species, I noticed one or two inaccuracies had crept in, which I take this opportunity of correcting. Thus "costal blotch" should be read "dorsal blotch," and in the nomenclature, Professor Zeller's name *E. Gallicolana* should be sunk as a synonym of *Obscurana*, Steph., which must be adopted for this species. The galls from which the majority of mine were bred were the round hard galls of *Cynips Kollari* (Devonshire gall), and only one specimen emerged from the galls of *Andricus terminalis* (the well known oak-apple). I have also submitted a series of my bred examples to Mr. C. G. Barrett, showing how very variable the species is, and I am happy to say he entirely agrees with my opinion as to the identity of these species; indeed he writes "No other conclusion could reasonably be arrived at, for the variations in the pale portion of the hind wings, in the shape and colouring of the fore wings, and in the form of the dorsal blotch, cover the whole range of the supposed distribution between the species."—W. P. WESTON; 1, Duncan Terrace, Islington.

AUTUMN PUPATION OF *ABRAXAS GROSSULARIATA*.—In November last year, I noticed on some old gooseberry and currant bushes what I first thought to be some old pupæ of *A. grossulariata*, but on pulling one or two off was surprised to find them alive and fresh. I collected about seven dozen and tried to rear the imagos, but failed, as the frost killed those I kept outdoors, and those I kept in dried up. This year, in October, I was in the same garden, and in two days I collected about forty dozen, and saw the larvæ in all sizes, from a quarter of an inch in length to some spinning up. I also found several pupæ which had only just changed, as they were yellowish in colour and quite soft.—H. SILCOCK; 22, Randolph Street, Camden Town, N. W., November 11, 1878.

GNORIMUS VARIABILIS.—Two specimens of this beetle were

taken at Tooting Common in a decaying oak, last summer.—N. C. GRAHAM; Tulse Hill.

HUMMING OF *ACILIUS SULCATUS* AND *COLYMBETES FUSCUS*.—Whilst *Acilius sulcatus* is humming it slightly raises the elytra and protrudes the tip of the abdomen; the tips of the wings are also often slightly advanced beyond the elytra. The sound is, I am convinced, produced by very rapid vibration of the wings under the elytra, for the tips of the wings may be seen in very rapid motion up and down, and the extremity of the body often appears slightly greyish from this vibration. If also the elytra, the prothorax, the head, or the tip of the abdomen, be touched with the point of a fine needle, the vibration may be very distinctly felt; and if this is carefully done the beetle will not discontinue its humming. The sound produced changes in its tone just previous to its ceasing, as it does immediately the beetle extends its wings for flight. During the humming the maxillary palpi are moved with a twitching motion, and the antennæ are vibrated. These organs have, however, nothing to do with the noise produced, as they may be touched and stopped with the needle without causing any alteration in the sound. The male of *Colymbetes fuscus* I find hums in a similar manner, but not so frequently as *Acilius sulcatus*. Both males and females of *A. sulcatus* produce a similar sound.—A. G. LAKER; Court Hill Road, Lewisham, November 6, 1878.

OBSERVATIONS ON *ACRIDA VIRIDISSIMA*.—By a perusal of my friend Mr. Tenant's paper on *Acrida viridissima* (Entom. xi. 183) and Mr. Hodge's subsequent notes on the same insect (Entom. xi. 274), I have been induced to add thereto those of my own, which possibly may be interesting, and as this fine species is very local it may not be so well known to many. A short distance from this city (Norwich) there appears to be quite a colony of these insects, which seem to confine themselves to a radius of a mile or more, where I have for several years past been entertained by their nocturnal concerts in my "nothing" expeditions. The males commence their stridulations just before sundown, which extend far into the night, and the performance of several of these insects in close proximity is almost deafening: the male only "sings," but I suspect the female of uttering a faint chirp, but of this I am by no means certain. The male generally takes

up his position on the topmost twig in the hedgerow—often on an ear of corn,—which position he will maintain during the whole of the evening, and will there “rasp” away unceasingly for hours, if not disturbed; he will often be found performing on or near the same twig the next evening. Three years ago I turned out a male of this insect in my garden, who perched himself on the topmost branch of a tall larch tree, where he carried on his harsh evensong for more than a week, when I missed him, and never heard him afterwards. These insects seem to be gifted with a species of ventriloquism, for it is often extremely difficult to mark the spot whence the “singing” appears to proceed, one’s sense of hearing seems to be entirely baffled by them; sometimes you fancy the noise on the right—now it seems to come from quite an opposite direction; to get a sight of the singer is not always an easy matter—the moment he hears a footfall his song ceases until all is silent again, when, feeling convinced that all danger is past, he again goes at it as vigorously as ever. I have found the best way of capturing this insect—supposing he can be seen—is to get behind him if possible, approaching him very cautiously, for he is a wary fellow, and taking him by the long legs or “hoppers,” if I may so term them; if not careful he is capable of inflicting a sharp bite, which I know by experience; in this way I have often captured from three to six of them in an evening. In confinement these grasshoppers will sing as vigorously as if in their native haunts; they are omnivorous; I have frequently observed them devouring blades of grass and other vegetable matter, which, however, seems to constitute their most natural food; they are also fond of sugar, and small house-flies they are particularly partial to; if one of these be put into the cage, it often remains unnoticed for some time, until it happens to approach the grasshopper, when it is suddenly seized and devoured. *Acrida viridissima* is a confirmed cannibal. I have had at least one proof of its depraved appetite, for, two or three years back, I had two in confinement for some time, but on looking into the cage one morning I observed one of them coolly “breakfasting” on the dead body of his companion, lately “departed.” These insects will quickly bite their way through muslin or leno, and should be confined in a cage covered with perforated zinc, which I have found the best material to keep them “at home.” The constant habit of licking the tarsi

referred to by Mr. Tenant (Entom. xi. 183), appears to be the chief employment of these insects during the daytime. August is the month when this species makes its appearance, and its song may be heard thence away to the latter end of September.

"He is an evening reveller, who makes
His life an infancy and sings his fill."

—R. LADDIMAN; Upper Hellesdon, Norwich, December 16, 1878.

OAK-LEAF HAIRY GALLS (*SPATHEGASTER TRICOLOR*).— On May 25th last I found these galls in considerable numbers at Shanklin, Isle of Wight, on low-cut hedge oaks. They were apparently full grown, three-tenths of an inch or so in diameter, and, as yet, unperforated. Five days later the first *Spathegaster* appeared. On the morning of May 30th I passed, on my way from Brading Harbour to White Cliff Bay, through Centurion's Copse, which contained many pollard and cut oaks. On them I found these galls in such numbers as I had never before seen. The leaves in many instances were literally loaded with them, thicker than currant galls often are. Next day, on an excursion from Shanklin to Apse Castle, I again found these galls in great profusion, always on cut oaks. Throughout the island the hedgerows, as in Devonshire, are frequently planted in high banks, and have numerous small oak-trees growing along them. The roots of these strike through the bank and throw out shoots which, being cut year after year, become thick and bushy. On these the galls are found in astonishing numbers. They are usually met with on the under surface of the leaf, though at times they appear on the edge, or, at least, the leaf has so curled round during their growth as to expose them to the sun and light. When this is so they show, as in the case of many other galls, bright crimson, more or less diffused according to exposure. When much shaded (and it seems to be the habit of the parent insect to oviposit in situations where this, as a rule, occurs) the galls are almost snowy white, and are then thickly beset with hairs. As they grow older, and especially when much exposed, these hairs dry up, and in very many instances the galls are found perfectly glabrous. In all cases they present a beautifully waxy appearance, often resembling a delicate green, or green and red, miniature peach. They are frequently so aggregated as to make compact clusters, and coalesce to form double and treble galls. Sometimes even as many as six or eight will be fused together in

this way. Occasionally some galls are found which are clearly distinguishable in appearance from the rest. These are comparatively small—one-tenth of an inch or less in diameter. They distort the leaf more, are less waxy in appearance, and yellower in colour. When pressed they are firm and hard; when cut, woody and nut-like. These contain inquiline larvæ, two, three, or more in a single gall. The first imago of these (*Synergus albipes*) emerged on June 23rd. Other galls, normal in appearance, had been already attacked by parasites, the larvæ of which, as early as the end of May, were found actively feeding upon the juices of their hosts. By June 24th they had passed through their several metamorphoses and emerged from the galls. Mr. Fitch has been kind enough to determine the species, which comprise *Callinome auratus* (male and female), two kinds of *Pteromalidæ*, and one *Eurytoma*; all common in these and allied galls. As with other organisms, galls have their favourable and unfavourable years, and last season seems to have produced *Spathegaster tricolor* in exceptional numbers. In my own neighbourhood, where, as a rule, this gall is but sparsely met with, it has been this year found in comparative abundance both by Dr. Ransom and myself.—G. B. ROTHERA; Nottingham, Nov. 18, 1878.

A BETHYLID (OXYURA) BRED FROM GALL OF ANDRICUS TERMINALIS.—I have just received from Mr. G. B. Rothera a specimen of the common *Perisemus triarcolatus* Först (= *Bethylus fulvicornis*, Curt.) which emerged on April 14th last from an old oak-apple of *A. terminalis* collected in the previous December.—EDWARD A. FITCH; Maldon, Essex, November 19, 1878.

HEDYCHRUM BRED FROM CYNIPS KOLLARI GALL.—Dr. Capron informs me that in May, 1877, he bred *Hedychrum* (*Homalus*) *auratum* from these galls. I have never met with it as a gall-inhabitor, but Westwood says "M. le Comte de Saint Fargeau states that the females of *Hedychrum* sometimes deposit their eggs in galls" (Introduction to Mod. Class. Insects, ii. 178) and both Kollar and Giraud obtained this species from bramble galls (Verh. z.-b. Gesell, Wien. xiii. 1288) where it was parasitic on *Cemonus unicolor*. In the instance now mentioned, whether the gall had previously been taken possession of by an *Osmia*, or whether the Ruby-tail was parasitic on some legitimate inhabitant, does not appear.—ID.





ATTACUS ATLAS

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ATTACUS ATLAS: A LIFE-HISTORY.

By PHILIP HENRY GOSSE, F.R.S.

THE Great Atlas Moth of farther Asia, the vastest of all known Lepidoptera, has always, with me,—at least since I began to collect and study Insects, now more than six and forty years ago,—been invested with a halo of romance; and to rear it through its various stages,—egg, caterpillar, pupa, imago,—this seemed too grand a vision to come within the range of hope, if hope is truly defined as desire with expectation. There was the desire, indeed, but the expectation was *nil*.

When I returned to England from America, in 1839, I saw, hawked about in the streets of London, (what doubtless my readers have often seen, for it is common enough, as I afterwards found),—a case of Chinese insects. A box, lacquered, and gilded, and glazed, crammed as full as it could hold, with insects of all Orders, and in the midst a noble *Attacus Atlas*, in perfect condition, a female stretching more than nine inches in expanse of wing, of the variety γ of the Brit. Mus. Catal. p. 1219. That very specimen I still possess. I bought the whole case, threw away the herd of plebeian beetles and bugs, retaining only a few of the finer *Papilionidæ* as satellites to *Atlas*, re-papered and re-furbished the box, making it hermetically tight, with such success that the lapse of forty years has not produced the slightest trace of mite-dust on the paper beneath the heavy-bodied Moth. Barring a little fading of the rich red and brown hues, the specimen is as perfect as it was then.

I do not mean to represent the acquisition of this example as any special achievement in science; it was but to myself the first incident in the history which I come to narrate. Even then the

species was common enough in all museums and private collections. It had been described by Linnæus, Fabricius, and Gmelin; pictured by Petiver, Seba, Valentin, Knorr, Merian, Cramer, Olivier, Hübner, and others;—so that no exotic insect was better known than “Le Géant des Papillons.” It is, too, a wide-spread species, ranging over the south and east half of Asia, continental and insular;—common on the slopes of the Himalayas, and all through India to the points of both peninsulas; abundant in China, as I have already intimated; scattered over the isles of the Archipelago, from Java to the Moluccas, to Borneo and the Philippines:—a range of 35° of latitude, and 55° of longitude.

As is often the case with animals of extensive habitat, this magnificent Insect is subject to considerable variety. The variations range in two groups, according as the curious windows in the wings are single, or accompanied by small side-windows. The possession of these glassy areas, of definite forms, and usually set in dark frames, is highly characteristic of the *Saturniade*, the noblest family of the Moths; in some, indeed, reduced to little more than a mere slit of glassy membrane, as in our English Emperor Moth (*Saturnia carпинi*), the only native example of the family; but in many taking large dimensions, and remarkable forms, whence these Moths are called by the French *Porte-miroirs*. Few have these windows more conspicuous* than the grand species before us.

Common as *Attacus Atlas* has been in all the museums of Europe for more than a century, our familiarity with it has been limited to its adult, imago condition: we have known it very well as a Moth; but, in other respects, not at all. What were the earlier stages of this noble insect? That the caterpillar would be generally like that of our own Emperor, we might confidently conjecture from analogy; that it would spin a cocoon of silk in which it would pass its pupa-life, there could be no doubt; but the dimensions, colours, and forms, of these, in detail, no one knew, in Europe at least. Some light irradiated the subject,

* In two species figured and described by Mr. Westwood in Proc. Zool. Soc. Lond. for 1849 and 1853,—*Attac. Mythimula* of Port Natal, and *Att. Zacateca* of Bogota, the fenestrae are larger in proportion than in *Atlas*, though the insects themselves are much smaller; the latter of the two being indeed a tiny *Attacus*, though most elegant in form and rich in colour.

about twenty years ago; when Dr. T. Horsfield and Mr. F. Moore published two vols. of "A Catalogue of the Lepid. Ins. in the Mus. of the E. Ind. Comp." In the second vol. of that fine work, a full synonymy of the species is given; a description of its transformations by Lady Isabella Gilbert; and a note of its habits in Java. Lady I. Gilbert, in N. India, writes (1825):—

"A specimen (female) was caught on the 4th of September. On the following morning she laid several pink-and-white eggs. On the 15th the young caterpillars were hatched. Being uncertain what plant they fed on, I placed them on slips of different trees, viz., apple, plum, peach, &c. The young caterpillars were black, with numerous white spines; as they grew larger, and changed their skins, the spines became covered with a kind of white powder, giving them a very delicate appearance; added to which, the ground-colour of the body, since the first few days after they were hatched, had become a light green. They always ate their skins after casting them. Day and night they devoured the leaves, and those on the apple-branch grew to an enormous size: on the 12th of October one of these began to prepare for its transformation by bending back a large leaf, and inclosing itself in a web, which it completed on the 13th. During the three preceding days it had considerably diminished in size: this I have observed to be the case with many larvæ prior to their change. On the 22nd of June following the moth came out."

To this the authors have added:—"Feeds on the Melokka *Phyllanthus emblica*), Kupu-gaja, &c. December to January. Rather common. (Horsfield MS.)" The full-grown larva and the cocoon are figured from the last-named authority.

In a valuable "Synopsis of the known Asiatic species of Silk-producing Moths," (Proc. Zool. Soc. for 1859), Mr. Moore has, of course, included *Att. Atlas* (p. 265). The account in the "Catalogue" is repeated verbatim, with the following additional note. "It is said that the Chinese Tusseh silk is obtained from the cocoon of this species."

Mr. F. Walker (List of Lep. Ins. in B. Mus. Part V.—1855) gives, besides a copious synonymy, a diagnosis of eight varieties of the imago; but not a hint of the early stages.

The mortality which has, during the last quarter of a century, fallen on the cultivated Silkworm, not in Europe only but also throughout Asia, has caused an anxious search in various countries for other silk-spinning species, and the introduction of several of these into Western Europe; in hope that some might

prove available substitutes for the long established *Bombyx mori*; or, at least, valuable aids to it. The success of these endeavours it is not my present business to exhibit; they have certainly not been wholly futile; suffice it to observe, that among these importations the cocoons of the glorious *Atlas* have at last gladdened our occidental eyes.

In March 1868 M. Braine, of Arras in France, received thirty cocoons of *Atlas* from that learned entomologist Captain Thomas Hutton of Mussooree, whose researches on the debilitated condition of the old Silkworms, and suggestions for their renovation, are well known (Trans. Ent. Soc. 1864, 1865). M. Braine has given us* a brief relation of his success in rearing the species. The cocoons being kept dry, in July evolved the moths, seven and a half to nine and three-quarter inches in expanse. Through the irregularity of their emergence, coupling was accomplished with difficulty, and only a few (fifty or sixty) ova were produced, which were of a rose-colour, and not quite so large as those of *Yama-mai*. These he wintered in a warm room; and the larvæ were hatched about the end of the following June (1869). He fed them on the common pink barberry, in the open air, exposed to the sun. Many of them died at the third moult; more still at the fourth. At last, however, a few went into cocoon, towards the end of August; these were exhibited to the public at the Exposition des Insectes (Oct. 1872). This time the marriages of his pets were much more normal, and he obtained a considerable number of eggs, and some "very remarkable" moths. He hoped now to prosecute his culture on a large scale. But the war in 1870 blasted his hopes, wasted his plantations, and just permitted him, with difficulty, the means of recommencing. Having replanted his barberries, and nursed his protégés, M. Braine obtained in 1872 a full success, and exhibited satisfactory results at the Exposition of Luxemburg.

"I think I may say," concludes the enterprising naturalist, "that I have acclimated this magnificent species of Bombycidae, of which each cocoon weighs, on an average, two grammes [or $\frac{1}{16}$ th of an ounce]."

"The *Attacus Atlas* is very inert and somnolent: when once it is attached to the tree, it is, so to speak, glued to it, and does not fall like *Yama-mai*. It is very fond of water; thrice a day I gave the worms a fine and soft rain, which always revived them. The fourth moult is the most

* *L'Attacus Atlas*, le géant des Papillons; son introd. en France, par M. A. Braine et Maurice Girard.

perilous: a scarcely perceptible black speck appears under the last segment, and spreads so that in two days the caterpillar is wholly changed in colour, and decomposed. . . . The silk is of the same colour as that of *A. Cynthia*: it is very strong and brilliant. I have not been able yet to attempt the winding, but hope to report on this shortly."

I am not aware that this hope was ever fulfilled; nor that the world has heard any more of M. Braine's experiments. To his Memoir, which was originally published in the Bulletin of La Société d'Acclimatation, June 1873, M. Maurice Girard, the able and learned Secrétaire du Conseil, appended a *Note Entomologique*. In this we find a very valuable epitome of the genus *Attacus* (=Fam. *Saturniadae*), and of *Atlas* in particular; so far as they were known up to that time. On the early stages of the species he has nothing to present except the note of Lady I. Gilbert, which he translates from Horsfield and Moore. He gives a description of the adult larva, but this is manifestly drawn up from the figure of the English naturalists, *not from the life*.

The closing remark of Dr. Girard is worthy of citation:—

"It is worth observing that this species, in those hot regions, behaves like *S. pyri* and *carpini* with us. The eggs hatch soon after they are laid; and the long latent life is that of the pupa. On the contrary, with M. Braine, it is the eggs which endure longest, as with the common Silkworm and the *Yama-mai*. This seems to point to a colder climate, and perhaps indicates the race as being from the Himalaya."

The first living examples of *Attacus Atlas* seen in this country, that I have been able to hear of, were a dozen living cocoons in the possession of Mons. Alfred Wailly of 110 Clapham Road, Memb. and Laureate of the Soc. Acclim. of Paris, and author of several interesting Memoirs on the Culture of Silk-producing insects. These cocoons had been imported direct from India, early in the year 1877; but not by M. Wailly himself, and he is not able to trace the exact locality, but believes that they came from the slopes of the Himalayas. It is remarkable that no Moth emerged from these cocoons during the whole year 1877, so wet and cold; but, in July 1878, imagines were evolved of both sexes, which proved to be a variety of unusual richness and brilliancy of colour, as well as of unusual dimensions;—one female, as M. Wailly assures me, measuring ten inches and a half in expanse. It is most unfortunate that he was unable to obtain any marriage of this race.

Meanwhile, in the spring of 1878, two hundred cocoons were imported from Bangalore, in South India, by Mr. Wm. Watkins of 36, Strand. Of these, fifty were purchased by Mr. Wailly, but the majority of the importation were (as I learn from Mr. Watkins), allowed to emerge* in order to procure a stock of ova, which afterwards he largely distributed.

Of these cocoons, two came into my possession, one from M. Wailly, on the 5th of May, the other from Mr. Watkins, a month later. The latter was the first to emerge.

Early in the morning of July 26th, I had the pleasure of seeing, hanging within the glass door of my cocoon-cage, a male of great beauty, and in high perfection. It differs much in form and colours from my old China specimen. It is very dark and rich in hues,† one-windowed; apparently the var. α of the Catal. Lepidopt. Br. Mus.; *Heterocera*, p. 1219.

* "So successful was I that I had only four bad cocoons, and *not one cripple*. I found, however, that, unlike most *Saturniadae*, they were not easily paired: in several instances, the sexes, though placed together when freshly evolved, refused to copulate. Some indeed did, for a few hours: others were united for twenty-four hours; yet from these I procured *no fertile eggs*. The only eggs that hatched were females that had been in copulá for forty-eight hours." (Mr. Watkins in litt.)

† This specimen is quite worthy to be compared for beauty with that one described and figured by Mr. Adam White, as a distinct species, by the name of *Att. Edwardsii*. I know it, indeed, only by the diagnosis, description, and figure in the Proc. Zool. Soc. (1859, p. 115, pl. Annul. lvii.); the author has omitted to say where any type-specimen is preserved. The chief points of difference between mine and this species (?) are the following: the fenestrae have the longest angle pointing, in *mine*, towards the base, in *Edw.* towards the point, of the wings: they are margined with yellow in *Edw.*, of which, in *mine*, there is no trace. The white bands are wider: the black hue in the central region is wider, the luteous chains of the edges are more conspicuous, in *Edw.*; and the lovely roseate flush at the tip of the fore-wings, appears lacking. There is no reference to more than a single original; to constitute a species from one specimen, on variations such as these, is very hazardous, especially when the recognised species is one subject to so much variety. On the whole, I cannot but look upon *Attacus Edwardsii*, until further evidence appear, as a more than doubtful species.

It is right to mention, however, that a very high authority is of a different opinion. Since this note was in type, Mr. F. Moore, of the India Museum, writes me as follows:—"The *Att. Edwardsii* is undoubtedly a distinct species; . . . We have two specimens, male and female, in our Cabinet, from Darjiling. Specimens are also in the British Museum, which are referred to in Walker's Catalogue, Suppl. p. 524. The larva is unknown to me." As Darjiling is 7000 feet above the sea, and has a climate in which rain and snow are abundant in winter, and humidity is constant, it surely would not be difficult to acclimatise this noble form (be it variety or species) in the British Isles. And I cannot but hope that soon living cocoons may be collected by some of the residents there, and transmitted to us.

All this was to be learned afterwards. There it was, clinging to its own vacated cocoon, with horizontal wings; and thence it allowed me to remove it, tenderly, to another foot-hold, on which it remained till noon in my full sight, with no attempt at motion, except an occasional slow and dignified flap of the vast wings. Reluctantly, to preserve its perfect beauty, I now prepared a bed of bruised laurel, in a tight glass vessel, to which I transferred it together with its foot-hold. It stirred no more than before, soon lapsed into perfect quietude, and, as I hope, insensibility, under the powerful narcotic. At the end of seven hours I introduced a drop of Cyan. Pot. Sol. into the thorax by the side; though there was not the slightest sign of life; then pinned and set it, (by means of narrow strips of thin paper across the wings) with perfect ease and success.

Was I not a little hasty in closing the life of my beautiful new-born? I had yet another cocoon in my box, and I had some reason to think it would prove a female. But this was uncertain. If so, it might not evolve for a fortnight, and I might get no marriage. I knew that a single night's liberty would spoil the exquisite beauty of my treasure. And so, having well weighed the *pro* and *con*, I thought it safest to secure the moth for my cabinet in its perfection.

Possibly, had I read the future, my decision might have been different; for two days had not quite elapsed, when my other cocoon produced the imago, and this a female! It had, however, fallen from its hold of the suspended cocoon before I saw it; and contact with the bottom of the cage had prevented its due expansion; for, while the fore wings were perfect, the hind wings were shrunken and shrivelled. It was of a very different variety from the male, being of the two-windowed division, answering to var. γ of the Cat. Br. Mus., p. 1219. The distortion of the wings rendering this example useless for the cabinet, I determined to see how long she would live; and therefore placed her in a bell-glass of fourteen inches' diameter, quite open, as she was incapable of flight, the vessel resting in a flower-pot on a table in my study. She survived fifteen days, vigorous most of the time; for a week at least, I think she continued nubile, if there had been a bridegroom at hand. During the day she was motionless, the wings expanded horizontally; but at night-fall she began to flap her great wings with much vigour and incessant pertinacity,

and with the regularity of a machine, of which, indeed, the sound very much reminded me. She laid, in the first week, stuck in groups and strings to the surfaces around, about one hundred and sixty eggs, barren, of course; but which agreed in size, form, and colour, with fertile eggs of the species, which I had just received from the same sources as the cocoons.

EGG.

The egg of *Attacus Atlas* (Plate, fig. a.) is not so large as that of *Anth. Pernyi*, and not nearly so large as that of *Anth. Mylitta*, being about 0.08 inch in length, broadly, but irregularly, ovate, granular on the surface,* white, clouded with purple-brown, which tint centres in an irregular mass of intense depth. All this colour is readily washed-off by a few moments' immersion in water, the tinge being communicated to the water; leaving the whole surface of the egg of a delicate greenish-white. The darkest portion of the colour is now seen to reside in a knot of jelly-like membrane†, which, when softened by the immersion in water, can be drawn out to considerable length, but possesses great tenacity, and great elasticity, and adheres to the egg very firmly.

Of fertile eggs I received a dozen from Mr. Watkins, which had been laid on the 23rd July, and a dozen from M. Wailly, laid

* Examined with the Microscope (4 in. obj. Powell's) by transmitted light, the appearance of the egg-shell is highly curious. The whole substance is semi-opaque, studded equally everywhere with elliptic rings of light, separated by little more than their own area, and inclosing a space absolutely opaque. Each ring is brighter at one side of the circumference than at the other, which suggested the thought that the light was reflected from a raised edge of a cavity. But a revolving of the stage under my eye, made no change of the illuminated side: and a shutting-off of the rays from the window that impinged on the stage did not diminish it. It was therefore transmitted light through the rings; it was the same whether the interior or exterior surface of the egg-shell were next the eye. I can suggest no other explanation of the appearance than this; the entire shell of the egg is perforated, nearly (not quite; for the light of the ring is not quite the light of the sky reflected from the stage-mirror, but evidently transmitted through a very thin medium), by a symmetrical series of ring-like cuts, within the area of which the shelly substance rises exteriorly into thickened knobs; whence the deeper opacity; and which produce the delicate granulation. It is probable that here is a provision for the supply of air to the unborn larva. But why should this species need such a provision more than others? In the large egg of *Mylitta* there is nothing like it. When this is examined under like conditions, there is an appearance of irregular pits all over the shell, but there is no transmitted light, no semblance of even approximate perforation.

† The alternately distended and collapsed egg-tube. (See Owen's Comp. Anat. Insect. (1855) p. 491; fig. 166.)

just a week later. Curiously, these two batches were hatched on the same day and hour, viz., between 6 and 9 A.M. of the 9th August. Already the little worms manifested the sluggish character common to them through life: they were slow in issuing from the egg; and then crawled little, and slowly.

LARVA.—1st age.

The new-born larva is about 3 lines long in repose, 5 lines when crawling; (fig. b.) General colour black, with a broad band of light grey running down the back for the whole length, and crossed, on the side of each segment by two white lines. The tubercles are tall cylinders of pure white, tallest in front: all of them have white bases, which, uniting laterally, form conspicuous transverse bars of white, one on every segment. From each tubercle proceed several very slender black hairs, of great length. Head glossy black, unspotted; the clypeus grey. Anal region white. Feet black. Prolegs grey.

The habit of the little worms is to sit on the under side of a leaf, almost always in a doubled, or sub-circular position, the head being bent round on either side, toward the tail. I detect no tendency to congregate socially, as *Att. Cynthia*, and *S. Promethea* do when young.

In addition to these, I obtained, at intervals up to 30th August, from Mr. Watkins, between sixty and seventy larvæ, almost all new-born; so that my education has included about eighty-five larvæ in all. My first solicitude was to feed my tender stock. I had observed that, in most cases, the first meal was made of the egg-shell; if the young worm were left for some hours, I found the vacated shell eaten to an extent considerably more than was necessary for exit; even to one-fourth of the whole egg.

Something more nutritive than this was necessary, of course:—but what? M. Braine had fed his protégés on the barberry; Lady Isabella Gilbert hers on apple, peach, plum, "&c.," but implies that they did best on apple. Mr. Watkins recommended plum. I thought it well to ask the caterpillars themselves which they preferred. This inquiry (as I have done with other species) I put to them in the following manner:

A common flower-pot saucer I filled with an inch of sand, which then I made thoroughly wet, but with no standing surface-water. Into this I stuck one good leaf of each of the following

trees, observing that each was cut with a foot-stalk, and that the edge was entire throughout; careful to handle the leaves as little as possible with my fingers.

Oak	Apple	Berberis Darwinii
Sallow	Beech	„ aquifolium
Hornbeam	Hawthorn	Orange

When the leaves were thus made to stand upright in the firm sand, I tenderly transferred a single worm to each; and then clapped a bell-glass over all.

The first leaf that was nibbled was sallow (*Salix cinerea*); I saw the caterpillar in the act of eating it; for I kept the tiny nursery pretty well under my eye. Then the oak was just notched. The next morning willow and hornbeam were a good deal eaten; and on the day following, still more; oak a little eaten, and afterwards more. The one that had been put on *Berberis Darwinii* I saw on the second day busily and perseveringly gnawing at the central spine of one of the leaf-stipules; when it ceased, I saw with a lens that the hard and sharp point had been gnawed off. But very little more was done to this, and nothing to the other Berberry.

I noticed also the leaves on which they spontaneously chose to rest, as being suggestive:—they congregated, as I carefully noted their places, morning by morning, on oak and willow chiefly; hornbeam and *B. Darwinii* slightly; the rest not at all, nor on poplar, hazel, and birch, leaves of which I subsequently added: apple remained absolutely untouched, and even avoided.

With the exception of one killed by accident, as I was putting down the bell-glass, my first losses occurred on the day that the worms were one week old. On the 16th I saw several, in which the new white head of the second age was dilating the skin, and thrusting-out prominently the present head; a sure token of the approaching moult. But one was lying, not quite lifeless, but moribund, on the damp sand; shrivelled and drying-up. Another was one of those which I have alluded-to as close to the first moult: it also was lying helpless. This one I tried to aid. The minute grains of fine silver-sand were entangled between the tubercles, and in and among the pro-legs. My first effort was to remove these. If it had been able to crawl it would have thrown them off, and left them behind. But it was inert and helpless; and unless I could free the pro-legs it would not cling again, and

so would not be able to get through its moult, not being able to leave the slough behind, as every one knows.

With a lens in one hand, and a fine feather-point wetted in the other, I patiently removed the grains, one by one, avoiding any violence to the tender body. The grains adhering to the underparts, which would be most injurious, were hardest to be got at. At length, however, I pretty well got rid of all, and placed the little worm on a horizontal leaf. The power of clasping with the pro-legs was, however, so feeble, that the least movement made the worm roll over sidewise; and I feared to leave it thus. Then I bethought myself of the following device: I cut off a flat willow-leaf, and laid it, face-downward, on the sand; the midrib forming a slender projecting ridge. Against this I gently placed the little worm, and had the pleasure of seeing that presently the pro-legs had taken hold of the midrib, while the flat position of the leaf prevented the danger of rolling over. After a quarter of an hour, I perceived that the clasp was firm; and now I could gently lift the leaf, and turn it over in the air, the worm being below, without any relaxation of its hold. My care, however, proved vain; for the worm died where it was put, without being able to accomplish its moult.

Several now died in rapid succession. Wishing to preserve specimens in this age for my cabinet, and their minuteness precluding the hope of inflating the emptied skin, I took one or two of the dead worms as they were, and simply gummed them on a card. A day or two afterwards I perceived one of these bodies very much changed in appearance. Examination by a lens showed that the body was greatly eaten, the fragments lying strewn about; and by its side a loose cocoon, containing a white pellucid larva, about half as long as the little *Atlas* caterpillar. It was certainly lepidopterous; very nimble, much like that of a *Tortrix* or a *Tinea*: it had manifestly been parasitic in the *Atlas*. This contretemps gave me a new glimpse of the perils to which my pets were exposed.

But some passed happily through their first moult. One of these I was so fortunate as to detect at the beginning, and watched to its completion. The process is familiar to all silkworm breeders, and needs not to be recorded anew. What seems noteworthy is, that the tubercles were (not only as they were successively uncovered, but even after the process was completed)

very considerably shorter and more conical than in the former stage. "Parva componere magnis,"—the new-skinned larva reminded me of one of the rays of *Uraster glacialis*, for the cone-shaped tubercles. In a few minutes, however, I was conscious of a change in their form; they were evidently lengthening, by the protrusion of their points, into tall and slender columns. As these grew, insensibly, yet rapidly, the extremities were thrown into angles and curves, which presently were gradually straightened: just as we see the wings of an imago, on emersion from pupa, expanded, not uniformly, but very irregularly, one side at a time, through which the fluids are pouring; while, in the parts immediately near, they are, for the moment, inactive. The result is, to distort, and bend, and crumple, one portion at the expense of another, till this in its turn receives its supply, and presently straightens. So with these crooked tubercles: they were crooked because (minutely slender as they were) the expanding fluids were pouring through a portion of their diameter at a time: but, as I have said, all was equalized in due course, and every tubercle became a very tall and slender cylinder with an expanding base and a slightly clavate summit; and the symmetry of all was perfect, before an hour had passed from the beginning of the moult. So long were they now become (viz. about equal to the diameter of the body) that the impression produced on the unassisted eye was that we looked on a very hairy caterpillar; though, really, there were no hairs, but a few excessively short bristles at the clubbed tip of each tubercle, so minute as to be detected only with high magnifying.

LARVA.—2nd age.

The larva of the second age, a few hours after its moult, may be thus described. Dorsal portion of the body white, mottled on the sides with neutral-tint and cream-colour: a large irregular patch of rust-red on each side on the third and fourth segments, and another of the same hue, still larger, on the ninth, tenth, and eleventh. Ventral surface black. Tubercles white; except the lowest series of the three thoracic, and the penultimate segments, which are dark grey. Head polished chestnut-brown. Prolegs grey.

The next day after the moult, the whole larva is clothed with a white farina, very thick and clogged, similar to that of *Attacus Cynthia*, but much denser. It seems to be exuded only from the

white parts; and not from the grey, black, and red spots: though so copious is the exudation that these coloured patches are considerably encroached-upon by the intrusive substance.*

On the 26th—ten days after the first moult—one of them, by a second moult, passed into the third age. I had observed it at 9 A.M. the new head projecting, waiting its change, and at 11 all was completed. It was on the same leaf as before, just above the sand; where the exuviae, if fallen from the leaf would surely have been lying; but I searched in vain for any trace of it, except a tiny heap of cylinders of white farina, which, I presume, had clothed the old tubercles, and in the middle of these the old skull, or rather skin of the face. I could not avoid the conclusion that the new-changed larva had made a meal of his cast-off clothes. I had many such examples afterwards, and in some instances actually saw a good part of the exuviae devoured; so that this habit may be considered normal.

LARVA.—3rd age (newly moulted).

The larva, in passing into the third age, has not conspicuously changed in colour; but by careful examination I detect differences. The general ground-hue is a semi-pellucid white. The upper and middle series of tubercles, longer and slenderer than before, are white, the lowest series blue-black. The first segment is dark grey, between the white bases of the tubercles; the hinder three segments are minutely speckled with grey. The sides are marked, on each segment, with four diagonal bands, irregular in outline, highest behind, of which the upper two are pale grey tinged with red, the lower two dark grey. The two irregular clouds of rust red, on each side, are become somewhat wider, and somewhat brighter in hue. The face is polished light bay, the lip dark, the cheeks white. Feet and prolegs dark grey, with deeper bands: the hindmost prolegs have a thickened margin of

* I suspect that this substance is a true Wax, analogous to the *Pe-la* of China, and to the *White-lac* of Madras. (*Kirby and Spence*, Lett. x.) Having allowed a caterpillar to touch the surface of a plate of glass, I examined it by the microscope. I saw many groups of very short and very slender fibres, so arranged as to suggest that they had been exuded in thin laminæ of definite width, which then had partly disintegrated (perhaps by contact with the glass) into their component fibrillæ; for they manifestly had been parallel, and still had curves and irregularities of form, in common. Having lifted, with care, a minute portion from the tip of a tubercle, by the point of a needle, and transferred it to the glass slide, this appeared much more as irregular thin plates, of which the fibres, though visible, were much less distinct, and less apparently parallel. The substance resembled wax, in its adhesion to the glass, and in the smear it left when moved.

cream-white, which gives a curious appearance of a sort-of pedestal-basis to the extremity of the animal. The length when crawling is about nine inches.

On the same day another larva had arrived only at its first moult. The protrusion of the new head had been going-on increasingly, so long, and it was manifestly so uneasy, that I thought its moment must be near; and I carefully removed the leaf on which it rested to watch the process. But so long it continued to writhe, inflating its fore-parts, and turning painfully from side to side, that I began to fear its case was hopeless, and that there would be no moult. In such cases, I have before given mechanical aid with success. I now got a fine needle, and under a powerful lens I essayed to abrade the stretched skin behind the black old head. But these touches of mine only made it toss from side to side more violently, and, at length, to loosen its foothold of the midrib of the leaf on which it had clung.

At last I reluctantly gave up hope, and left it lying on the leaf. In half-an-hour, however, I again looked; when, to my surprise and pleasure, I saw that it was more than half-moulted, and looking most promising. There was, however, no attachment of the hind prolegs, and I knew there would be difficulty there. Thus my obstetric aid came in; for with the point of the needle, I held back the pushed-down skin, till the tender hind-parts, even to the last segment and prolegs, were duly drawn out, without the slightest lesion. Then it appeared a quite normal and healthy worm of second age. Yet it never ate more, never grew, never crawled,—but shrivelled and died, like so many more, in four or five days!

A curious instance of self-help occurred under my eye. A larva of second age was evidently annoyed by the fecal pellet, which having been duly ejected, hung, from some accidental contact at the rectal orifice. I watched. Presently it elevated the hinder parts, and bent them round leftward. Then the head was brought round to the same side, deliberately, and as if with difficulty. At length with a jerk, and a snap, it seized the pellet in its jaws, and threw it out to some distance in front.

But, one by one, they all died. The one that had attained the third age, survived the longest, but succumbed on the last day of August. The larvae of this species do not in any age either fall, or crawl from their twigs, while healthy, as do some of their

congeners. On two or three occasions I have found the larvæ of *Atlas* on the sand, apparently uninjured, evidently just fallen, and I have replaced them and they have taken hold; but these invariably died without removing farther. A fallen caterpillar is a lost caterpillar, at least in *Attacus Atlas*.

Before matters had quite reached this pass, however, I had procured, from Mr. Watkins, nearly sixty more larvæ, mostly new-born, but a few just entered upon their second age. These came on leaves of plum, on which Mr. Watkins tells me he had fed them exclusively. Yet I thought well to give them a choice of food as before. Accordingly, I had prepared for their reception a six-inch flower-saucer of wet sand, into which I plunged leafy twigs of willow, plum, apple, and Japan quince. The larvæ were sent through the post in tin canisters, in two lots, arriving on the 25th and 30th of August. Some of the first lot were dead, but these were not counted: the second lot were all active. Among the twigs of their nursery I distributed the plum-leaves which sustained the larvæ, carefully handling them by means of pliers, avoiding contact with my fingers. Fearing that I had kept my former in a too confined atmosphere, I decided to give these a freer air, trusting to their proved stationary habit to avoid loss by wandering. Accordingly, the saucer with its little forest, now stocked, I placed in the bottom of a thirteen-inch bell-glass, seated in the mouth of a flower-pot;—covered, indeed, with a piece of white blonde at first, but after a few days allowed to remain quite open in my study-window, the window open day and night at top, facing the S.E.

These conditions, with an exception of place to be after-mentioned, remained unchanged, during the history. The food, also, I by-and-by made wholly fallow; for I found, after a full fortnight's trial (during which I had offered oak, sloe, and pear in addition), that they manifested a very decided preference for fallow, above all,—plum alone maintaining any rivalry with it.

The leafed twigs maintained their succulence well in the damp sand. At intervals of three days I changed the food, and examined the larvæ, keeping a careful register of the number, as distributed in their several ages. My procedure was this: I spread a large sheet of paper on a table, to which I lifted the saucer from the bell, which latter I cleaned out. Then I removed one by one, with pliers very carefully, the old twigs,

laying them tenderly on the paper. A new set of food-twigs had been already prepared; and the surface of the sand in the saucer having been swept of frass, and damped afresh, these fresh twigs were stuck-in, and the saucer re-placed in the bell-glass. Now the effete twigs were subjected to a searching scrutiny; such of the leaves or shoots as supported worms were cut-off with scissors and dropped among the new leaves, examined, and counted, and recorded at the same time.

My little family quickly diminished. Scarcely a single examination passed without revealing some corpses lying flaccid on the sand: but even more were unaccountably missing. This fact, occurring again and again, greatly surprised me. The circumstances made it impossible that any could be overlooked. I examined every leaf with the utmost minuteness, and laid it on paper for re-examination if desirable. The area was a flat surface of wet sand, on which the worms, dead or alive, could not be concealed. The saucer was searched on all sides before it quitted the bell: the clean glass of the bell, when the saucer was removed, would not conceal a cheese-mite. What then could have become of six, and eight, and three worms, absolutely vanished in intervals of three days? I can only suggest that the living larvæ devoured their fellows! I have abundantly proved that the newly moulted eat their own cast skins: and the transition from this to the eating of their dead or dying fellows, is perhaps, not very great. It is noteworthy that none were ever missing after the earliest stages were passed.

Individuals of this family passed into their successive ages at intervals of about seven or eight days; viz., on September 1st, 7th, 16th, 24th. On the 9th, half of the stock were gone, only twenty-five left; on the 17th, when the fourth age was reached, twelve were left; on the 24th, when the fifth age, seven were left. From the first I aspersed the whole nursery four or five times a day, by drawing my finger along a nail-brush dipped in pure water, and depositing an impalpable dew on the whole. I fancied that the worms enjoyed the moisture in so fine a form.

LARVA.—3rd age (advanced).

I have described the larva when newly passed into the third age. After a few days it was much changed in appearance. So wholly and so thickly was it now clothed with farina, that it appeared entirely snow-white, the

orange clouds on the sides seen only as tiny specks; the iron-grey of the lowest tubercles, the feet, and the mottling of the last three segments, all distinguishable only by using a lens; when even the white cheeks are seen to be sprinkled with the same flour. The tubercles of the dorsal and middle rows are very thickly clothed; and by their arrangement give a peculiar aspect to the caterpillar, which it had not before, not even in this stage at first. Those of the prothorax project over the head in close array; those of the metathorax are perpendicular; those of the mesothorax sloping intermediately. Then the abdominal series have a strong backward inclination, and about equally; so that the transition from the thoracic to the abdominal series is abrupt and marked in the *facies*, though really the former are graduated *inter se*. The length now attains about one inch.

LARVA.—4th age (fig. c).

Greenish-white; the skin all studded with minute oval darker specks, which give the impression of translucent cells in the substance. The orange clouds on the sides are nearly obsolete, especially the posterior ones. Last segment azure, with the oval specks dark blue. A rondo-triangular ring of rich pale orange is now conspicuous on the outside of each hindmost proleg. Face wholly pale green; lip and clypeus margined by a black line. Thoracic tubercles shorter and blunter than before; the rest much increased in length, and become soft spines, lying nearly flat, pointing backward and overlapping; lowest row dark iron-grey. Feet and prolegs iron-grey; the latter crossed by a band of greenish white. The farina is again very thick, and is excreted early.

(To be continued.)

GRANARY WEEVILS: SITOPHILUS GRANARIUS AND S. ORYZÆ.

By EDWARD A. FITCH.

OF all destructive weevils the one which most affects the much talked of "British interests" is the granary or corn weevil. Our own three and a half millions acres of wheat have enemies enough to contend with, attacking, as they do, root, stalk, leaf, ear and kernel; but it is after the corn has passed safely through these and other ordeals and is harvested, threshed and granaried, that the *Calandra* appropriates the never to be wasted bread-stuff. The damage to our home-grown wheat, however, is but as a drop in the bucket compared to its destruction of foreign grain, and that drop is, in a sense, of our own seeking, as home-grown

wheat would never become affected unless either that is taken to the weevils or the weevils brought to it. It is certainly at times necessary that it should be granaried, but the damage by weevil is always occasioned by carelessness or heedlessness in shooting it in old dirty, uncared-for granaries or mills, which themselves are sure to harbour the little beetles, or by laying it in close proximity to some affected foreign corn. With foreign wheat weevils are a necessity. Our immense imports—somewhat exceeding our home growth, and drawn as they now are from all quarters and corners of the globe—are either affected on shipment or speedily become so from the dirty, unswept and uncleansed granaries into which the corn finds its way. The little pests could certainly be got rid of by shippers to a great extent if they would only try. The improved service and quickened passages has lessened weevil loss in corn to a remarkable extent within the last few years. Question a corn merchant used to foreign trade, and the answer will be somewhat as follows:—"Oh! we know and hear nothing about weevil now to what we used to years ago. I have seen cargoes absolutely alive with them, and so that they burnt everything up."

The wheats which are now affected to any very serious extent are the Indian, and I have often seen samples of the excessively dry Calcutta and South-eastern Asian wheat in which it was almost impossible to find a perfect corn, the valuable starch of the kernel being consumed by the destructive little weevils. *Calandra*, like wheat and many other useful products, with their attendant evils, is undoubtedly an introduction from the East. Weevily wheat is invariably dressed after landing, and a large percentage of the little beetle are thus screened or blown out, but, of course, many of the perfect insects resident in the corn, and all in the larva or pupa state escape, the kernel not yet being light enough to be separated. When the cargo is very badly affected—when the whole bulk seems alive, as I have myself seen them on very hot summer days—it is a common practice for merchants to spout it, i. e., to shoot the grain down a spouted trough, in which at the angle is a wire sieve with the meshes large enough to let the weevils pass through, but not the corn, which runs into the granary or into sacks as the case may be. By such means the quantity of weevils and dust sifted out is enormous, and this appliance is generally so situated at the wharves that the beetles

are deposited near the edge of the wharf or even in the river bed, and if not naturally washed away at high tide, are swept into the water, their destruction being thus easily accomplished. The great heat generated in a bulk of weevily corn is caused by the dust arising from the borings and frass of the insects. The weevils themselves are generally to be found inside the granaried heap or cargo of corn unless the weather is very hot; then they are especially lively on the outside.

Although these granary weevils are the most destructive enemy to stored corn, they leave sound what they do not actually attack. This is not so with that other great enemy, the wolf moth (*Tinea granella*, L.), which spoils more than it eats, by spinning the grains together with its dirty silken web, and thus becomes a more troublesome pest perhaps, though less destructive, than the *Calandra*. This is a somewhat analogous case to the attacks of mice and rats in corn-stacks, the least enemy being the greatest spoiler.

Reliable statistics as to actual damage are always difficult to get. The Rev. D. J. French tells us that sixteen bushels of weevils were dressed out of 360 quarters of wheat in December, although the corn had been turned every week (Entom. iii., 59), but the worst attack I find recorded is on the excellent authority of Mr. James Vogan, brought before the meeting of the Entomological Society by Mr. Jenner Weir, April 4th, 1870. It was stated that 10 cwt. of weevils were screened from 74 tons of Spanish wheat, and "that in August, 1868, some American maize was stored, weighing 145 tons; in August, 1869, this was found to be infested with weevils, and 6 cwt. of the beetles were screened out; in December, 29 cwt. more were screened out, making a ton and three-quarters in all." ('Proc. Ent. Soc.' p. xv.) We are not told what the maize actually lost in weight, but 35 cwt. of weevils must have consumed something very considerable. This quantity would represent over four thousand millions (4,056,729,600) specimens of the beetle. By actual weighing and counting, I find 1 ounce (avoirdupois) contains 530 grains of sound English wheat; or 1320 grains of weevil-attacked kernels, consisting of English and foreign wheat mixed with many imagos and larvæ of the *Calandra* in the corn; or 64,680 specimens of *Sitophilus oryzæ*, consisting of dead imagos, but not old and dry. From these numbers the calculation of damage is not difficult, but it

also becomes plain how soon the attack may become a matter quite beyond all calculation or remedy.

The life-history and description of these little pests has often been written, but in very few instances has it been from actual observation, changes being rung on the copies and recopies from the older observers downwards. From the limit of circulation these were of necessity original, and in the case of many insects, owing to superstition and folk-lore, they are indeed very original. In Britain, Kirby and Spence, and Curtis are still served up in all forms, without a particle of attempted original research, or even new information or confirmation, in many of our special journals devoted to agriculture and horticulture. It is this which delays progress; independent observation is needed, even if not to establish new facts, to confirm many old beliefs. Now with regard to these corn or granary weevils, *Sitophilus granarius* and *S. oryzae*, their economy may not be of great import; we know the damage and we know the damager in its perfect form, although its larva is the first destructive, and in its earlier stages, living as it does inside the corn itself, it is safely entrenched and impregnable. Probably from these circumstances the granary weevil has been much neglected by entomologists. Curtis's information is all derived from Leuwenhock and Olivier; he knew neither eggs, larvæ nor pupæ. Few there are who have scientifically examined the species of weevil and other allies which affect the various cargoes of grain.

The *Calandridæ* is a family of *Rhynchophora*, which contains many exotic species, whose larvæ are very destructive to various valuable palms and cycads. It is somewhat remarkable, for including species so different in size as the large *Calandra palmarum*, which measures nearly two inches in length, and our little *S. granarius*, which scarcely exceeds one-eighth of an inch. The larva of *C. palmarum* is (or was) celebrated as being considered such a delicious dainty by the natives and even others (*teste* Kirby and Spence). To this family belongs the species which, as Rye observes, is emphatically known as *the* weevil. These weevils, which include both scientifically and naturally two closely allied species, are now included in Schönherr's aptly-named genus, *Sitophilus* (= grain-loving). In all weevily corn the snouted unicolorous *S. granarius*, and the *S. oryzae*, which has two red spots on each wing-case, will be conspicuous as the

most abundant and most destructive insects. As far as my own experience goes *S. oryzæ* is by far the commoner of the two.

These weevils are frequently accompanied by many other *Coleoptera* belonging to different families, the economy of which is little known. Curtis mentions five species as so found, viz., *Silvanus surinamensis*, L., *Cucujus testaceus*, Fab., *Ptinus crenatus*, Fab., *Uloma cornuta*, Fab., and *Trogosita mauritanica*, L. I have met with fifteen. Four of these and a near ally of another are mentioned by Curtis—the large black carnivorous *Trogosita mauritanica*, of which I found two or three specimens in the spring; the abundant and variable little *Silvanus surinamensis*; the much less common, large, reddish *Uloma* (*Gnathocerus*) *cornuta*, and the active, flat, brown *Læmophlæus ferrugineus*, Steph.—Curtis's *Cucujus testaceus*—which, except in one instance, was not generally common. In November, 1878, I found a specimen of the somewhat spider-like *Ptinus fur*, L., crawling on the glass of one of my stores, in which nothing had certainly been introduced since the previous autumn, so that it must have bred there. In addition, I have found the little Brachelytrous *Stenus unicolor*, Er. (= *brunnipes*, Waterh. Cat.), but only one specimen, which probably got in by accident; it is micro-insectivorous: the round, shining *Gibbium scotias*, Fab., was also probably an accidental visitor, as were certainly the few specimens of *Coccinella bipunctata*, L., which were found; the dark brown, elongate, cylindrical *Rhizopertha pusilla*, Fab., was very abundant; the pretty oval, four-spotted and lively *Alphitophagus 4-pustulatus*, Steph., only occurred in one store, but then commonly; the two red-brown *Tribolium* (*Stene*) *ferrugineum*, Fab., and *T. confusum*, Duval., occurred generally, as did the more shining *Hypophlæus depressus*, Fab.; the well-known *Tenebrio molitor*, L., was found occasionally, and its "meal worms" are still feeding away in two or three of my stores. The samples were not all of equal quality; for instance, No. 1 contained *S. oryzæ*, *R. pusilla* and *Silvanus* very commonly, *T. ferrugineum* rarely, and a few of *L. ferrugineus*, but no *S. granarius*. No. 2 contained *S. oryzæ* most of all, *R. pusilla* very abundant, *T. confusum* a good many, and *G. scotias* one or two specimens, a few *S. granarius*, but no *Silvanus*, and no *L. ferrugineus*. No. 3—the Stambourne store—seemed to be altogether different; here was *H. depressus* instead of *Tribolium*, *S. granarius* instead of *S. oryzæ*, together with *A.*

4-pustulatus quite common, *S. surinamensis* and *L. ferrugineus* common, these last two species less abundant than usual, and so on. No. 3 was dressed from English wheat which I believe had been granaried at Stambourne in North Essex. Dr. Power* has kindly named the species for me in all instances. I also met with many specimens of an Hemipterous insect in various stages

* In answer to my queries Dr. Power has kindly written me as follows:—
 “*Cucujus testaceus*, Curt., in Waterhouse Cat., is given as the same as *ferrugineus*, but both in Waterhouse and in the modern Sharp's Cat. the genus *Cucujus* vanishes, and the insects are all *Læmophilus*. I have taken all the British species, but invariably under bark, &c., excepting only our friend *ferrugineus*, so that I suppose is the only “corn-lover.” There is one species most closely resembling it, *L. duplicatus*, but I only know it as a bark insect. *Silvanus*.—I have taken several species, always under bark, or by sweeping, with the sole exception of our *surinamensis*, which is manifestly sitophilous; *S. unidentatus* is common under bark, &c., and the nearly allied *Nausibius dentatus* comes with sugar as far as I know. *Hypophleus*.—Other species, as *bicolor*, *castaneus*, &c., always in or under bark, but our one species, *depressus*, I have always had from granaries; I never saw it “at large.” *Tribolium* I never saw “at large”; *T. ferrugineum*, one of our species, I used to get from granaries at Cambridge; of the other, *T. confusum*, I found one or two mixed with my *ferrugineum*, but never saw many till you sent it; it is not in Sharp's or Waterhouse's Cat.; we used to call the other species *Stene ferrugineum* in J. F. Stephens' days. *Calandra*.—I used to get both species from the granaries as you do; as to the name, Waterhouse changed it into *Sitophilus*, but in the more recent Sharp's Cat. it is again *Calandra*, which I suppose should stand. *Alphitophagus* I used to get from granaries only, as you do, at Cambridge, but have not seen it alive for forty-five years until now. *Uloa cornuta* used to occur in meal, and of course *Tenebrio*, though I also take both species of *Tenebrio* at large. There is another beetle, *Niptus hololeucus*, which you have not mentioned, which one constantly finds marching about at large, and which I believe to be almost omnivorous, but I had once a specimen of corn meal containing it in hundreds. I kept it in a closely stoppered bottle which was never opened and for three years it continued to breed, developing larvæ, pupæ in a sort of cocoon, and the perfect insect, the numbers gradually diminishing. *Trogosita* I have taken at large in sandy places, but never got it in corn. *Gibbium* and *Ptinus* *fur* I have occasionally found crawling about, but doubt their being corn-eaters; *Ptinus* I have found in old skins, &c., in animal rather than vegetable matter. *Rhizopertha* I never took myself, but from the appearance of the corn in which it was found I should suspect it of feeding upon it; T. Wilkinson and the Scarborough entomologists, who seem to have worked largely in granaries, &c., used to get a quantity of it. *Stenus* and *Coccinella* are of course accidental. I should think there can be little doubt that *Alphitophagus*, *Tribolium*, *Calandra*, *Uloa*, *Tenebrio*, *Niptus*, and I think *Rhizopertha*, are actually “sitophilous,” but suspect, from the habits of other species of the same genus, that *Trogosita*, *Hypophleus* and *Silvanus* may be parasitic. *Læmophilus etematidis* is, I think, parasitic on *Xylocleptes biparus*. The behaviour of *L. Clematidis* is very like that of *Nemosoma elongatum*, which I know to be parasitic on *Hylerinus vittatus*, and probably *L. ferrugineus* is the same with respect to some of these corn-lovers.”

of development, which belongs to the genus *Piezostethus*, but does not agree with any of the British species, though it is nearest *P. rufipennis*, Duf. (= ? *cursitans*, Fall.). As might be expected, innumerable *Acaridæ* occurred; one very fine, dull brown, beetle-like *Gamasid* was very conspicuous, but was only found in the Stambourne store. There is certainly much yet left to repay a detailed study of *Calandra* and its surroundings, both as to which of the above-mentioned species are sitophagous and which predatory, also as to parasitism.

The increase of these *Calandridæ* and their allies is naturally limited by internal Hymenopterous parasitism. I have met with two (probably three) species of *Chalcididæ*, and Curtis knew another. About a dozen *Cerocephala formiciformis*, Westw., Wlk. (= *cornigera*, Wlk. = *Læsthia vespertina*, Curt., Hal. = *Epimacrus rufus*, Wlk. = *Lagynodes pallipes*, Voll.), or a very closely allied species, were bred. This is very interesting. Walker says of this, the only species of its genus, "It is semi-domestic and of rare occurrence, and may be parasitic on a house insect. I have seen it on paper at Killarney, in North Devon, in Lancashire and near London." (Entom. vi. 250). Haliday's figure of the species with details is there given, as also it was at 'Entom.' vol. i., pl. n., fig. 4, and in Part vi. of Walker's 'Notes on Chalcididæ.' In this figure the female is represented as wingless; my specimens are of both sexes, and in all the wings are fully or partially developed. According to Förster, Ratzeburg's *Sciatheras trichotus* is a synonym. This is described and partly figured in 'Die Ichneumoniden,' vol. ii., p. 209, pl. iii., fig. i. Ratzeburg remarks on its rarity; he only knew a single specimen, which being bred from worm-eaten ash was probably parasitic on *Hylesinus fraxini*. This specimen was a winged female, and the remarkable tuft of hairs on the wing is well figured. Although Dr. Mayr had not the species, I am indebted to him for the identification. The other chalcidideous parasite, of which I have over fifty examples, is a species of *Pteromalus*. Dr. Mayr writes me that he has over 10,000 specimens, mostly bred by himself, but the elucidation of such material is a work of long time and of great labour. Indeed, the *Pteromalidæ* seem beyond all control. Walker described upwards of 600 species, and I now have a number of his unpublished manuscript descriptions, mostly species of *Pteromalus*, which are quite useless, or rather would serve to make confusion worse

confounded. It is, therefore, as well not to give our *Sitophilus*-bred species a name at present. Curtis bred an apterous specimen of *Meraporus graminicola* from these weevils, but mine is not that species.

To return to the actual economy of the *Sitophilus*—the two species are so closely allied that practically they may be considered as one—the results obtained by that excellent observer, Miss E. A. Ormerod, are given in the present number, and my own observations are drawn from the study of the accumulations of the last three years, which now amount to eight distinct stores. It has been usually supposed that the parent weevil bores with its rostrum into the grain previous to depositing its egg in the hole made. I do not believe this is the case, for a very fine puncture only—such as would be made by a very fine needle—is to be seen on the borders of the germen in those grains which contain the larva. The egg is therefore laid, I think, just on the surface, as Olivier said, or under the outer skin of the germen, and the young larva eats its way in. One egg only is deposited in a grain, the flour of which just serves to bring the larva to maturity. It turns to a pupa in the grain, so that, unless very minutely examined, affected grains are not apparent until the emergence of the imago, except by their weight. The imago partially feigns death when touched, and on a tolerably smooth surface, such as paper or a painted board, can travel at the rate of about one foot per minute. How many broods there are in Britain is difficult of determination; it probably depends on many varying circumstances as to degree of warmth and the like, but the normal number is probably two annually. I have found the larva both in early summer and in late autumn. The rapidity of development also varies greatly. Hybernated imago, egg laid in May, second generation in August, is probably approximate for Britain in an unheated store-room. The only corn I have known to be attacked by *Sitophilus* is wheat, barley and maize. It does not touch oats, rye, canary, peas or beans, although Curtis appears to say some black oats (received from Lynn) were attacked in one instance ('Farm Insects,' p. 326). This statement, however, is not very clear; the attack may only refer to the wheat. In the larval state only one grain is destroyed by each insect, but it is probably much more destructive as an imago; and the beetles, which survive great extremities of temperature, appear to be

remarkably long-lived. Amongst some maize taken in 1876 affected with *S. granarius*, and in which I believe it has not bred, I have a quantity of specimens still (Nov. 1878) alive. It seems to breed very sparingly in this country, for when in want of a larva or pupa I have opened some hundreds of kernels from my stores without finding one.

As has been said, the *Calandra* is not indigenous, but through the agency of commerce—the importation of foreign corn—it has now become partially naturalised; but commerce, like agriculture, carries its own remedy against insect attack. Primitive commerce establishes the favourable conditions for the increase by supplying the requisite food and shelter almost in continuity. Primitive agriculture establishes favourable conditions by the increased supply of food through certain plants being brought into cultivation; hence the domestication, so to speak, of the natural limiter. But improved agriculture, by perfect tillage and cleanliness, establishes such rapid and perfect growth that the limiter loses its influence; so improved appliances in commerce will again protect the product against its natural foes.

The *Calandra* was encouraged by the necessary conditions to its existence being always present. In the granaries, always corn in some corner; in the means of transport, still food enough left to enable some to obey the high command to increase and multiply. Extended commerce necessitated a variety of materials and products for storage and transport, this to prevent mixing engendered cleanliness, and broke the chain of continuous favourable conditions; acting as the rotation of crops in agriculture. Then again commercial appliances with quicker and improved transport were greatly adverse to their increase. Although it is probable that, while we continue to import corn, we shall always suffer from weevil attack, the extent of damage will continue to decrease in proportion to the increase in facility of export and general improvement in commercial buildings and granary appliances. Old rough rafted partitions in warehouses and mills—the home of many noxious insects—are doomed; after their disappearance the spiders' work will not be required.

Many are the impracticable remedies which have been proposed for weevil limitation, but little can be expected from the use of specifics such as turpentine, benzine, and the like, or of various chemical preparations or "insect killers." Cleanliness

alone will do the required work, and this requires to be thorough to cope with such a crevice and cranny-loving, hybernating insect as the *Calandra*. Frequent lime-washing and scrubbing (with soft soap) of granaries, the plastering of all uneven wall surfaces, the asphaltting or concreting of all unlevel floors, the free use of the dressing machine or blower, and frequent sifting or turning over of the grain, are the only likely remedies against weevil attack. It is also necessary to guard against mixing sound wheat with any containing "weevil" except for immediate grinding; also to see to the destruction of all rubbish and tail corn in which it is possible for the beetles to live or breed. It was observed here during the late high tides, where corn was flooded, that the beetles were dispersed by the salt water; but this is only an accidental remedy which probably was worse than the disease.

It is an absolute necessity that in the case of ground wheat great quantities of the weevil, living as it does in the corn itself, should enter into the composition of the flour. This is unpleasant at least; but it has been conjectured that their presence is injurious, and in other countries disease has even been distinctly traced to the use of flour made from weevily wheat. Compare the vesicant properties of the *Mylabridæ* and *Meloidæ*. The following is an analysis of the *Sitophili*:—An acid analogous to gallic acid; a substance analogous to tannin; some choline; some phosphate of lime; some phosphate of magnesia; some silica; various sulphates; a peculiar animal matter; some fixed fatty matters; a bitter principle; a resinous matter.

One of my stores, containing some thousands of *S. oryza*, is kept in a closed tin, and repeatedly on opening this I have noticed a strong ammonia-like smell. Whether the internal application of "weevil" is injurious may be questionable, but enough has been said to show that its destructive powers are enormous, and that cleanliness and care will do much towards diminishing its ravages.

Maldon, Essex.

SITOPHILUS GRANARIUS,

By E. A. ORMEROD, F.M.S.

WE all know the *Sitophilus granarius* as one of our most destructive granary insects when left to pursue its ravages unchecked. Its rapid increase, and the total destruction of one grain of corn for each one of the myriads of granary weevils brought to maturity, make it a powerful enemy, but at the same time the effect of temperature on its powers of propagation acts as a check on its geographical distribution. The degree of warmth below which it will not breed, and its general history, have been given by various writers (see 'Farm Insects,' by J. Curtis, p. 324), but we have not yet the history of its near ally the *Sitophilus oryzae*, or rice weevil, as known in this country. Curtis mentions it as found in wheat from Ancona, and also in imported East Indian wheat, but did not trace out its history completely; and the probable effect of temperature on its rate of increase as well as on that of the *Sitophilus granarius* (our common "granary weevil") make it desirable to trace its life-history out in our own country, in addition to such notes of its habits as we possess from observers in the warmer continental climates.

During the last year (beginning at the 5th of September, 1877), I have had some opportunity of watching its habits as far as can be managed with a moderate supply both of weevils and of corn. Probably this comparative state of isolation does not give quite the same results that would follow study of the habits of the beetles in the great masses of corn in which they are usually to be found (in the case of Curtis's experiments on the *S. granarius* he was unable to rear it satisfactorily in small numbers), but still I had fair success, and found the increase of the *S. oryzae* to go on slowly and apparently with even more dependence on genial surroundings than that of the *S. granarius*. In general appearance and in size the two weevils are very similar, but the rice weevil is easily distinguishable by the two orange-coloured patches on each elytron, and also by the possession of wings, from the uniformly-tinted granary weevil, wingless in this country.

On the 5th September of last year (1877), I received from

Mr. Fitch a packet of the sweepings of corn ships known as "Indian dust," literally alive with these rice weevils from imports from the East Indies. At first they refused to have anything to do with English wheat sprinkled amongst them, straggling away at once from the grains and settling by preference on the broken bits of maize scattered with it; but after a while they commenced oviposition in the wheat, and on the 19th September the minute punctures showing the localities of oviposition were clearly visible at the extremity of the grain bearing the germ (where its softer nature affords an especially favourable position for deposit), and also occasionally in the harder part of the grain, but invariably on the convex side, never on that bearing the longitudinal furrow.

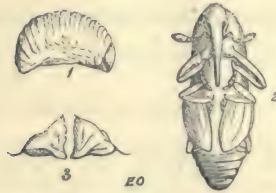
The punctures were obvious and in many grains, but though I searched repeatedly and with great care I was unable to find what might with certainty be considered the eggs—I found minute ovate-spherical bodies, which appeared to be eggs, both in the abdomen of the weevils and in the infested corn, but I did not find larvæ contained in them in any stage, and could not be absolutely certain of their nature.

On September 6th the beetles were pairing, and on placing them within reach of warmth from the fire they became very active, but during the rest of the experiment I kept them merely in the ordinary temperature of living rooms constantly used.

So far the autumn warmth, and warmth of locality, may have acted on increase, but after this I noticed no further advance till on the 9th March of the present year, when on examining some of the corn amongst which the weevils were placed on the previous 5th September, I found numerous wheat grains now each containing one larva, and there were also a very few pupæ, the latter, however, all dead in different stages of development. The infested wheat was easily distinguishable from the rest on pressure by the nail, the attacked corn giving way; the interior appearing to the naked eye simply as if the contents were more loosely arranged than usual, but showing under the microscope as composed of isolated atoms and variously broken masses of rejectamenta.

The thick fleshy grubs were now from a sixteenth to somewhat under the eighth of an inch in length when at their full stretch, but somewhat less in their usual curved position, and their breadth about two-thirds of their length. The grubs obtuse,

legless, and white; the head chestnut-colour; jaws also chestnut, darker at the extremity, bluntly pointed, and waved into two blunt teeth (see fig. 3). The segment behind the head and the caudal



extremity with a few small bristles. The movements of the larvæ during life and their contorted form after death make it difficult to sketch them satisfactorily, but fig. 1 represents a specimen fairly with the numerous corrugations which confuse the primary segments with the lesser folds, the under side being a complete mass of almost scale-like corrugations.

A few pupæ were now observable (on March 9th), but only two specimens were as fully developed as the one sketched at fig. 2, and on the 11th April the larvæ were active when disturbed in their grains, but no more pupæ were produced.

On the 3rd June I found only two more beetles, and on examining the grains of wheat I found one grain in ten with a tenant in some stage of development, for the most part still only in larval form and often stunted. A few grains contained specimens of the weevil in its perfect form, but for the most part they were small, distorted, and dead. As no farther progress was observable during the course of the summer, I made a selection of infested grains, but did not examine them particularly again till about the 26th October, when I found numerous beetles, but still not by any means corresponding in number with the infested corns of wheat, and the larvæ were still to be found in the grains, and some beetles only about half the ordinary size, and differing in marking from the normal type. In one case the elytra were altogether paler than the beetle, and in another the colour was prolonged from the spots so as to form a stripe, but the variety in marking, I believe, resulted simply from the sickness of the beetle having checked the usual development of colouring as well as of size.

In the healthy specimens the colouring was as in the

characteristic types, the wings were properly developed, and in one case I noticed an attempt at flight; but as far as one experiment goes, the slow rate of development which in thirteen months has only given one brood, and that not as numerous as the parent weevils, shows the effect of unfavourable climate or surroundings in materially retarding multiplication.

HYMENOPTERA IN NORFOLK.

By J. B. BRIDGMAN.

THE above heading would have been more correct if I had prefixed "want of," for this has been by far the worst season I have known for these insects. The first bee I met with was the male of *Anthophora acervorum*, on the 3rd of March; the unusually fine weather at the beginning of this month had tempted it out about three weeks before its usual time. The fine weather was soon over; the spring and summer here were generally dull and cold; so also was the autumn.

I have never seen the hedgerows so deserted by bees as during the past season. *Bombi* were scarce in the spring; and in autumn, when generally the red nettles abound with the workers, and thistle-heads with the males of many species of *Bombi*, and with these latter the males of their parasites the *Apathi*, this year these flowers were almost deserted. *Halicti* and *Andrena* were equally scarce; so in fact were the other genera.

I went to Brundall several times after the new *Nomada*, but could not find a single specimen. I was not much more successful in searching for *Macropis labiata*. After many visits I succeeded in taking a very few of both sexes on one day only, July 24th. Dull weather, with cold east winds, prevailed at this season. Two years ago I found a small colony of *Andrena Hattorfiana*, and took three females of the beautiful *Nomada armata* flying about the mouths of the burrows. I have not seen the *Andrena* since last year. I took another *Nomada* in the same spot, but could not find a single *Andrena* at the burrows or on the flowers of the Scabious in the neighbourhood; this is the only plant I have seen them frequent. In June I took for the first time, near this city, the pretty little *Andrena chrysoceles*. One of the best additions to my collection this year was *Bombus Smithianus*,

female and male; these were given to me by Mr. F. Norgate, of Sparham, who took them at Tresco (Scilly Isles).

Of the *Fossores*, the only capture worthy of note was *Agenia bifasciata*, two females and a male. I had not previously met with this insect; all three were taken running on the trunks of trees close to the city, and not near each other, although on the same side of the town.

I have to record two species of Ichneumons not included in Mr. Marshall's list:—*Cryptus amœnus*, Grav., and as neither this author nor Taschenberg has described the male, I have added the description of that sex, which differs only from the female in having the anterior and intermediate coxæ and trochanters white; hinder coxæ black, pale at the apex; hinder trochanter red, with a black spot above; the apex of the abdomen scarcely, or not at all, marked with white; both sexes of this insect were bred and kindly given to me by Mr. Laddiman.

Pimpla diluta, Ratz., also described by Holmgren, who describes only the female. I found two females and six males on the August Bank holiday at Brundall. The male, besides the usual sexual differences, is very like the female; the thorax has a little more brown on the mesothorax, and the extreme apex of the abdomen fuscous.

Opheltis glaucopterus. In Mr. Marshall's list only the female is noticed. As there is a good specimen of the male of this fine insect in the Norfolk and Norwich Museum, I take this opportunity of describing it. The only difference I can detect is that the prothorax, except the sides, pleura and metathorax are black, also a longitudinal streak of the same colour on the middle lobe of the mesothorax.

Norwich, December 27, 1878.

TWO NEW MICRO-LEPIDOPTERA.

By J. B. HODGKINSON.

DEPRESSARIA ATOMELLA, A SPECIES NEW TO BRITAIN.

During the summer of 1860, and again of 1861, I bred a number of this species from larvæ feeding on *Genista tinctoria*. The insect being so very handsome, and neither Allis, Edelston, nor any of our first entomologists, being able to identify it, I sent specimens to Mr. Stainton. He remarked that it was a pretty

form of *D. atomella*, the variation from the type (of what was then known as *Atomella*) being probably due to the difference of food-plant. For the last seventeen years I have bred this same species more or less freely; and it would appear, therefore, that my specimens were bred prior to the identification of it as a new species by continental entomologists. It is, I believe, proposed to retain for this species the name of *Atomella*, and to re-name the broom-feeding species (which has hitherto been called *Atomella*), *Depressaria scopariella*.

[The above communication is an interesting supplement to information which appeared in the E. M. M. for last month, and which information, Mr. Hodgkinson informs us, was based on specimens sent to, and on correspondence with, Mr. C. G. Barrett. Mr. Stainton, in his 'Natural History of the Tineina' (vol. xii. p. 226), points to the possibility of two species being confused under the name of *D. atomella*; and he states that "the two latest writers, Rössler and Von Heinemann, both agree in separating the broom-feeding species from that which feeds on *Genista tinctoria*, after we had for a series of years considered them identical."—ED.]

ELACHISTA DENSICORNELLA (*Hodg.*), A SPECIES NEW TO
BRITAIN.

Of this, hitherto undescribed, species I have been in the habit of taking occasional specimens for the last seven years at Grange-over-Sands, during the first week in June. I have sent, from time to time, specimens to Mr. Stainton. At first they were named by him as *E. teniatella*, but from this nomenclature I dissented. However, after further examination, in another year he returned my specimens as new to science, differing from *E. teniatella* by the thick antennæ. This distinction I had previously pointed out. Having now both males and females I think I may name and describe it. First of all it differs from *E. Adscitella*, *Zonariella* and *Megerella* by its black head, in which it resembles *E. teniatella*. From this last species it differs in that it is smaller, the anterior wings narrower; and by the interrupted band on the wings, the sides of which are parallel; but the most striking difference is that the antennæ are considerably thicker than any belonging to the banded group of the family, and the body is also stouter; the head, antennæ, body

and cilia are black. I have not as yet been able to discover the larvæ, and have only captured it in a walk near to Mr. Maude's house. Had it not been for this gentleman's kind permission to collect there, this species would probably have remained unrecorded.

Preston, January, 1879.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

HYBERNATION OF BRITISH BUTTERFLIES: SATYRUS EGERIA, &c.
—With regard to the hybernation of *Satyrus egeria*, the Rev. Joseph Greene in his paper, on "Pupa Digging, says:—"I have several times met with the pupa of this butterfly suspended from blades of grass when digging at the roots of trees. It is a beautiful grass-green colour, and passes the winter in that state." I have myself on two occasions met with a grass-green pupa suspended in the manner described, when digging in the autumn. One I found on September 16th last year, but as *S. Egeria* is very rare here I am inclined to think my pupæ were not that species. but *S. Megæra*. Unfortunately both died in the pupa state, and therefore I cannot be sure about the species; neither can I tell whether, under more favourable conditions, the perfect insects would have appeared as late specimens the same year, or remained over till the following spring. It is certain that *S. Megæra* does not always hybernate in the pupa state, since larvæ may be found feeding on grasses on mild spring evenings long before any perfect insects have put in an appearance; and this induces me to think that the pupæ I found would have produced perfect insects in the autumn had they been healthy. Possibly Mr. Greene may have had *S. Egeria* from his pupæ, in which case he could throw light on the matter. The fact that some of Miss Sotheby's larvæ became pupæ in the autumn does not go for much, since larvæ that are surrounded by abnormal conditions do not in all cases behave in a strictly normal manner. I see Mr. Fitch deems it necessary to give authorities in support of his statement that *Thecla rubi* passes the winter as a pupa. This fact has been established for so many years that no corroboration of Messrs. Buckler and Barrett's account is required, but as I am in the habit of taking the larva every season I may say that there need not be the slightest doubt upon

the point. Mr. Fitch further says that Mr. Moncreaff is the only authority he can find as to the hibernation of *Polyommatus Phleas*. I believe there is a larva at the present time hibernating on dock in my garden. I saw it early in the winter, and unless it has since been killed by the severe weather fully expect to find it again after the snow has melted.—W. H. HARWOOD, 8, West Stockwell Street, Colchester.

POLYOMMATUS PHLEAS.—With regard to Mr. Fitch's article on hibernation of the British *Diurni*, in the January number of the 'Entomologist,' I find this larva full fed in April, when looking among sorrel roots for *Gelechia* larvæ. I know it well. This, I see, confirms Mr. Moncreaff's notes (Entom. iii. 41).—J. B. HODGKINSON; 15, Spring Bank, Preston, January 9, 1879.

LYCÆNA ALEXIS HERMAPHRODITE.—A friend of mine while botanizing on the downs near Winchester, on August 23rd last, noticed a fine hermaphrodite example of this insect, which he captured, and, knowing my partiality to the *Lycænidae*, very kindly gave it to me. The specimen has the wings on the right side male, and on the left female; rather shot with blue, and with a small wedge-shaped streak of lavender extending partly across the under wing.—WALTER P. WESTON; 1, Duncan Terrace, N.

COLIAS EDUSA AND *ACRONYCTA ALNI*.—While staying at Freshwater, in the Isle of Wight, in the middle of August, 1878, I saw about a dozen specimens of *Colias Edusa*. I also saw one on the London and South Western Railway, near Southampton. I beat a nearly full-grown larva of *Acronycta alni* off beech in the New Forest on August 14th, but lost it while travelling.—C. G. NURSE; Southgate Green, Bury St. Edmunds, January 14, 1879.

COLIAS EDUSA IN DECEMBER.—I have now a fine living specimen of *Colias Edusa*, which I found on ivy last week. Is this not an unusual occurrence at this time of year?—JOHN STEPHENS; 3, Lee Road, Blackheath, Kent, S.E., Dec. 23, 1878.

DESCRIPTION OF THE LARVA OF *COLLIX SPARSATA*.—On the 18th of August, 1877, I received from Mr. F. D. Wheeler, of Norwich, a dozen larvæ of this species. They were of various stages of growth, but in a few days the largest were full-grown, when I described them as follows:—Length nearly an inch, and of average bulk in proportion; head rather flattened above, but

rounded at the sides; it is slightly narrower than the second segment, into which it can be partially withdrawn; body cylindrical and of almost uniform width throughout, tapering only a little from the eleventh to thirteenth segments posteriorly, and from the third to the head anteriorly; skin smooth and soft, having a few almost imperceptible very short hairs. Ground colour, bright pale green, the head pale brown; a green pulsating vessel shewing between a double whitish line forms the dorsal stripe; subdorsal lines also whitish, and there is another whitish line below them, but some distance above the spiracles; below the spiracles is a conspicuous broad stripe, whitish with a very faint blue tinge; segmental divisions yellowish; spiracles black; ventral surface almost uniformly pale green. Feeds on *Lysimachia vulgaris*. Before the middle of September all the larvæ had spun up; the cocoons were formed on the bottom of the cage and were tolerably firmly constructed of silken threads. The pupa is polished, about three-eighths of an inch long, and tolerably plump; it is of the ordinary shape, thickest at the ends of the wing-cases, and tapers rather suddenly to the anal tip; eye, antennæ, and wing-cases well defined. Colour of the abdominal segments rather pale brown; head, thorax, and wing-cases green. The first imago emerged on the 11th of June following.—GEORGE T. PORRITT; Highroyd House, Huddersfield, January 4, 1879.

NOTES ON BOMBYX QUERCUS.—It is now some years since I collected *Bombyx quercus*, but the following notes made in 1871 and 1872 may be of use to Mr. Laddiman in his investigations (Entom. xi. 270). In 1871 I took nine larvæ; two died in the larval state, three I gave away, two ate out of their cocoons as soon as they were spun, and died, and one imago emerged; leaving one cocoon to be kept over the winter, which rewarded me on June 22nd, 1872, with what I believe to be the variety *Callunæ*. In 1872 I took nine larvæ again; they all spun up, but only five imagos were the result, as in the previous year showing a large death-rate. The greater part were fed in a larvæ box, placed under some trees in the garden, the lid of which was covered with perforated zinc; after the cocoons were complete they were removed to a cage in the house.—GEORGE R. DAWSON; Poundsworth, Driffild, December 5, 1878.

OCCURRENCE OF MICRO-LEPIDOPTERA IN THE NEIGHBOURHOOD OF PLUMSTEAD.—I went down to Plumstead early in October to search for the larva of *Coleophora fusco-cuprella*, three of which I bred in June last from larvæ collected there the previous autumn, on hazel. In one sheltered spot I found twenty-three larvæ of this species, but they appeared to be very local, my captures being made in the space of about a dozen yards, and although I searched the neighbourhood for some distance I was unable to detect any trace of it in any other place. *Nepticula microtheriella* was widely distributed, and although rather late for the larvæ, many of the mines being empty, I found above a score, with a few of another species. *Ornix avellanella* and *Lithocolletis corylella* were in the greatest profusion on the same bushes. The mines of *L. acerifoliella* were also abundant in maple leaves; and a fortnight earlier, between united leaves, the larvæ of *Gelechia scriptella* were not uncommon. *Thecla betulæ* occurred sparingly in birch leaves, and *Lithocolletis ulmifoliella* commonly. The brown mines in dogwood of the larvæ of *Antispila Treitschkiella* were not so frequent as usual, but I secured sufficient to breed a fair series. *Coleophora albitarsella* were in numbers on the ground ivy and *C. gryphipennella* on the dog-rose, but as these do not become full fed till the spring is fairly advanced I left them for a more favourable opportunity. The bladder-like appearance of the leaves of *Artemisia vulgaris* betrayed the presence of the larvæ of *Gracilaria omissella*, while the roots supplied me with the larva of *Ephippiphora scæneana* and *Dicrorampha simpliciana*.—W. MACHIN; 22, Argyle Road, Carlton Square, E., Jan. 4, 1879.

TINEINA BRED IN 1878.—The following notes from my diary may be of use to beginners: *Psyche calvella*: a few specimens; larva taken in May on oak and buckthorn, at Highgate; according to my experience, it is useless to take any but full-grown cases. *Lampronia rubiella*, from raspberry, and *Incurvaria capitella*, from currant-shoots: larva inside, feeding on the pith; from a garden at Hornsey; bred a long series of each. *Scythopia cratægella*: freely bred from larvæ in a web on whitethorn; from Greenhithe. *Depressaria costonella* and *Gelechia mulinella*: in abundance; from larvæ in shoots of furze and *Genista anglica*; from Wanstead. *Parasias lappella*: from seed-heads of *Arctium lappa* collected in April; they emerged in July in scores; they change to pupæ in the seed-head; these I got in the Warren,

Folkestone. *Anarsia spartiella*: a long series from larvæ on furze; Wanstead. *Hypercallia christiennella*: fine specimens from larvæ collected near Sevenoaks. *Argyresthia pygmaella*; freely from catkins and shoots of willow; from Greenhithe. *Coleophora genistæcolella*: larva abundantly in many parts of Epping Forest, wherever its food (*Genista anglica*) grows. *C. saturatella*: a long series from larvæ on broom; Wanstead Flats. *C. virgaureella*: in abundance from larvæ on golden-rod; Sevenoaks. *C. juncicolella*: a few specimens from larvæ swept at Shirley Hills, in March and April. *C. hemerobiella*: a long series from larvæ feeding on whitethorn; near Woodford; pear and plum is given as its food, but I have never found it on those trees, although I have repeatedly searched in many localities for it. *C. albitarsella*: freely bred from larvæ found on ground-ivy in lanes about Woodford. *C. alcyonipennella*: from larvæ on *Centaurea nigra*; Box Hill. *C. bicolorella*: a long series from larvæ on nut; Hackney marshes. *C. viminetella*: in abundance from larvæ on willow; Hackney Marshes: also *Cosmopteryx Drurella* from same locality; larvæ feeding in hop leaves. *Cemistoma scitella*: freely from larvæ mining leaves of whitethorn; lanes about Loughton. *Elachista megerlella*: from larvæ in leaves of *Dactylus glomerata*; a long series; Hackney Marshes. *E. gangabella*: captured a few specimens in a sheltered corner in one of the hollows in the Forest, near Woodford; I hope to be able to find the larva this spring, now I know a locality. I have also bred *S. pasivana* (*sinuana*) rather freely the last two seasons, from larvæ feeding in the flowers of *Chrysanthemum leucanthemum*; they draw two or three of the florets together, which is a sure indication of their presence; various parts of Kent and Surrey.—GEORGE ELISHA; 122, Shepherdess Walk, City Road, N.

COLEOPTERA IN 1878.—As far as my observations go, the year just passed was by no means a good one for collecting. Owing to the cold wet spring, the willow and whitethorn blossom was almost entirely lost, while the superabundance of rank grass and herbage throughout the summer prevented the sweeping-net being used at all profitably. Many species which I took in abundance in 1877 were exceedingly scarce, particularly among *Geodephaga*. *Brachinus crepitans*, however, was an exception, and occurred to me under singular circumstances. Having threshed some wheat in bad condition, I had it exposed to the sun on a sail-cloth.

Each morning when the covering was removed, Bombardiers by the dozen scampered down the sides of the heap. Hitherto I had only taken it sparingly, so that finding it in abundance corresponds with the remarks of Mr. Hopkins (Entom. xi. 256). I suppose the warmth generated by the damp wheat was the source of attraction. With it was *Anthicus floralis*, equally abundant, and a few Staphs. Although the aggregate of beetles taken during the year was comparatively small, somewhat over five hundred and fifty species (exclusive of *Brachelytra*) were represented, among which the following may be worthy of passing notice:—*Polystichus vittatus*, *Dromius quadrisignatus*, *Badister peltatus*, *Cryptarcha imperialis*, *Cryptophagus populi*, *Mycetophagus quadriguttatus*, *Dermestes Frischi*, *Aphodius lividus*, *Drilus flavescens*, male and female (previously recorded), *Telpehorus figuratus*, *Cionus thapsus*, *Sibynes primitus*, *Magdalinus barbicornis*, *Molytes germanus* (Mr. Jeffery and I came upon a colony of these monsters feeding upon *Heracleum* in a sandy wood), *Trachyphleus alternans*, *Otiorhynchus fuscipes*, *Brachytarsus scabrosus*, *Zeugophora flavicollis*, *Cryptocephalus sexpunctatus*, *Conopalpus testaceus*. I am indebted to Mr. Champion and the Rev. W. W. Fowler for naming several, and removing my doubts respecting many more of my captures.—THOMAS H. HART; Kingsnorth, January 7, 1879.

MICROGASTER FROM PIERIS RAPÆ.—Last summer I bred a large number of these little ichneumons from the cocoons given me by Mr. W. C. Boyd (see Entom. x. 302, note). The larger stigma shows it to be a different species to the *Brassicæ*-feeding *Apanteles glomeratus*. I failed to find a name for it with the help of Haliday's papers in the second volume of the Entomological Magazine, so applied to Mr. F. Smith; but there being none of Haliday's types of *Microgaster* in the Museum, he quite declined to attack Ruthe's lot. Mr. Foran, of Eastbourne, sent me some of these cocoons which were evolved from a *P. rapæ* larva on September 3rd last — EDWARD A. FITCH; Maldon, Essex.

DRYOPHANTA SCUTELLARIUS.—In walking through Cannwood in November last, I was struck with the size of some of the oak-galls on the under side of the fallen leaves. I filled a pocket with them, and on my return sent a few to Mr. E. A. Fitch, who pronounced them to be the gall of *Dryophanta scutellarius*, and

above the average in size. At the beginning of this month the imagos began to appear, and still continue to do so. My object in writing this note is to ask this question: How is the time passed until the imago can again deposit its eggs on the under side of the leaf? The leaf must, I think, be mature before it is deposited, or so large a gall would surely distort it.—G. C. BIGNELL; Stonehouse, Plymouth, January 16, 1879.

YORKSHIRE NATURALISTS' UNION.—At a meeting of the Entomological section of the Yorkshire Naturalists' Union held at Leeds on the 11th January, it was decided to publish a list with localities of the Lepidoptera of the county of Yorkshire. Its compilation was placed in the hands of Mr. W. Prest, of York, and myself. May I ask, therefore, that every lepidopterist who has collected in any part of Yorkshire, however little, will kindly send to me list with localities (and in the case of rare or unusual species, with *dates*), of all the species noticed, with any notes that may be of use, as early as convenient. I need scarcely say that all such assistance shall be fully acknowledged.—GEORGE T. PORRITT; Highroyd House, Huddersfield.

OBITUARY.

E. C. BUXTON.—About fifteen years ago there lived at Daresbury Hall, near Warrington, Mr. E. C. Buxton, a gentleman known to his friends as a genial companion, an ardent sportsman, and a keen lepidopterist. Although not his first collection of Lepidoptera (which was destroyed by fire at Walton-on-the-Naze), he then possessed one of the finest in England. Collecting assiduously himself, he also employed collectors to visit many distant parts of Britain in search of rarities. Mr. J. B. Hodgkinson says, "How well I remember his visits to me, fully thirty years ago, when making his second collection; and his telling me how pleased he was on finding a specimen of *Pieris Daplidice* at rest on a flower." He was one of those indefatigable collectors and sportsmen who prided himself upon his great catches, whether of insects, salmon, or wildfowl. Eventually finding his British collection becoming as complete as he could well make it, he devoted himself to foreign travel, and the study of African butterflies and birds. With this object he went to Port Natal, where he collected large numbers of insects.

Many of his rarities were presented to the British Museum, and were described by Mr. A. G. Butler, with coloured plates, in the 'Transactions of the Zoological Society.' Subsequent to his visit to Natal, he went to Sumatra, where ornithological studies occupied much of his time, and the new species he added to Science were described by the late Marquis of Tweeddale in the 'Ibis' of 1877. We believe that in all he made three journeys to Africa; his last voyage was to Zanzibar, where he again collected birds, but only for a short time, since he imprudently and contrary to advice would go out in quest of insects, &c., at night. This, as he had been warned would be the case, brought on an attack of fever which caused his death, a few months ago, at the age of sixty-seven years. He was buried on the banks of the River Niger by Bishop Crowther. His large collection of British Lepidoptera was bought by Mr. King, of Portland Road, some few years ago, and by him distributed to many purchasers. When salmon-fishing in the north of Scotland, Mr. Buxton used to capture many insects peculiar to the locality, such as *Boarmia cinctaria*, *Lobophora hexapterata* (the latter in large numbers), and the almost unique *Röslerstammia pronubella*; while he found *Scopula decrepitalis* in plenty. Nothing used to give him greater pleasure than the distribution of these specimens amongst his friends, of whom his generosity made many. We are indebted to Messrs. Frederick Smith and J. B. Hodgkinson for many of the above facts.—J. T. C.

N. C. TUELY, F.L.S.—We regret to have to record the death of this gentleman, which took place at his residence, Wimbledon Park, on January 3rd. Mr. Tuely was in his forty-sixth year. He was a general lepidopterist; and has been an occasional contributor to the 'Entomologist' from the commencement.—ED.

WILLIAM GOOSEY.—It is with deep regret I have to record the death of Mr. William Goosey, at Stepney, after a short illness, on the 20th December, 1878, aged seventy-four years. During his life, all the time he could spare from his business as a chemist was devoted to the study of Natural History, especially Entomology and Botany, of which latter science he was passionately fond. He has been a member of the East London Entomological Society since its formation, and by his death it loses a most useful and generous member.—D. PRATT.

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NOTES ON ACIDALIA CONTIGUARIA.

By HERBERT FORTESCUE FRYER.



ACIDALIA CONTIGUARIA (dark and pale varieties).

IN July, 1876, through the kindness of Mr. Capper, who showed me the locality in North Wales, I was enabled to take a few specimens of *Acidalia contiguaria*. I found it by no means common, even in its own peculiar and apparently somewhat restricted locality, though I searched assiduously and was assisted by Mr. Capper's sons, most indefatigable workers. From the imagines I took I obtained a few eggs, but as it was somewhat late in the season the larvæ hybernated, and though they all went into pupa in the spring I was not successful in breeding them.

The following year I obtained eggs from the same place, where I again had the pleasure of meeting Mr. Capper, who was collecting in the old spot. We both agreed that *A. contiguaria* ought to occur in other parts of North Wales—in fact, wherever the necessary conditions of food-plant, shelter, &c., were to be found.

Shortly afterwards, when staying a few days at Bettws-y-coed, I went out to look for *Contiguaria*, and at some considerable elevation I took what I afterwards found to be the dark variety, though so different was it from the light bone-coloured form,

which occurs at Llanfairfechan, that at the time I did not recognise it as the same species. It is a most difficult insect to detect, as it mimics very closely (as indeed also does the light variety) the rock on which it rests. The variety occurring at Bettws-y-coed is a somewhat larger insect, and is very much suffused with dark grey or black, and is, I find, remarked upon by Guenée, who says in his 'Histoire Naturelle,' vol. ix. p. 464, "Quelques individus sont de gris-cendre, d'autres, et ce sont les plus ordinaires, d'une couleur d'os un peu jaunâtres, avec les franges un peu plus rougeâtres. Une femelle prise dans la Lozère par M. Bellier, est presque entièrement envahie par des atomes noirs, comme certaines variétés de *Bisetata*."

It occurs at Bettws at a greater elevation than at Llanfairfechan, and on one of those Welsh hills where high winds, with heavy rains, and cold misty days seem to be alternate states of weather. I do not know whether these ungenial climatal conditions be the cause, but this darker form seems to me to be a more robust (if the term be admissible) type of insect attaining in certain individuals, and possibly averaging, a greater linear expansion than its light-coloured relative.

I have now bred some three or four generations of each variety, and have been surprised to find how true each keeps to the parent type.*

Some little time ago I wrote upon the subject to the Rev. J. Hellins, sending him specimens of each, and stating the main facts, viz., that each variety, as far as my experience and that of Mr. Capper went, was confined to its own locality; that the successive generations of each were true to the parent form; that, on the contrary, though differing *inter se* as some of the *Acidaliæ* do, I could see no specific difference. Mr. Hellins wrote to me, saying, that unless some recognisable difference could be detected in the egg or larva state, he should consider them merely varieties of one species, and he suggested I should forward larvæ to Mr. Buckler. This I did, and I believe they do not differ from the larva of *A. contiguaris*, as described by him (E. M. M. iii., 69).

* Mr. Salebotham, who has successfully bred this species for the last year or two, tells me he occasionally gets a darker-coloured brood. If now we may look upon this as a "reversion," it tends to bear out the hypothesis that the darker is the original form.

In a case of variation of this kind it is natural to inquire how far the facts are in accordance with the theories of "selection" and protective resemblance or mimicry, or more generally of "the adaptation of the organism to its environment." An interesting question thus arises as to how far this difference in colour may be due to climate, height above sea-level, and more sombre colour of surrounding rocks. Thus we have Llanfair-fechan—a sheltered habitat; on the sea coast (which generally infers a more equable temperature during the year); and light-coloured rocks, producing a light bone-coloured type. And Bettws-y-coed—a habitat at a greater elevation—much subject to high winds, rain and chill misty days, and with rocks of a darker hue and somewhat shaded with dark rust-coloured grey, producing a darker form.

Is the difference in these conditions sufficiently marked to account for a tendency towards Melanochroism? Or may we not conclude (from its greater pilosity and resemblance to an Arctic type) the darker variety to be the older or original type (possibly a survival from the Glacial period), and the light to be the aberrant form; and that the species originating inland and extending into a locality where the surroundings were of lighter hue, and which received a greater amount of sunshine throughout the year, accommodated itself to these new conditions, and gradually acquired, possibly for the sake of protection, the lighter tone of the rocks of its new locality?

Chatteris, January, 1879.

ATTACUS ATLAS: A LIFE-HISTORY.

BY PHILIP HENRY GOSSE, F.R.S.

(Concluded from p. 41.)

It was now past the middle of September; the weather set in windy and cold; I had not yet begun domestic fires; I therefore removed the whole ménage to an orchid-house, where there was a hot damp atmosphere, probably much like that of the Indian valleys whence the parents came. In one or other of my tropical plant-houses it remained thenceforth, save that, now and then, on a warm sunny day, when I wished to have the larvæ under closer observation, I replaced it for a few hours in my study.

On the 25th of September, several passed into the 5th age. One of these I detected at the very instant of beginning its moult. The first rupture of the old skin was certainly not on the back, but across the breast of the prothorax, extending backwards by a lateral rent on each side. The new face was early freed, and carried the old face on the lip and jaws, to be removed only by rubbing against surrounding objects, when the body was two-thirds denuded. The skin drags upon the dorsal region long after the sides: the long declined tubercles seem difficult of liberation.

The head appeared very small for the 5th age of so gigantic a moth; and so, indeed, did the whole larva. As the old skin was pushed off in folds, the farina flew about on the currents of air in the room, like the finest flour, and accumulated in little heaps on the leaves below. In general, these tiny heaps of dust are the only remains left where a moult has occurred; for the larva evidently devours its own exuviae. I wished to witness this operation; but, in neither of the moults that had occurred under my eye did the larva, after his labours, take any notice of the exuviae. Nor did this one for a while; but, by-and-by, he turned his head round slowly, and began to munch the exuviae, holding it up bodily in his mouth, till two-thirds were gone, when, the residue falling to the ground, he took no trouble to go down the twig to look for it.

LARVA.—5th age.

The ground-colour is now a pale yellowish green, or green-white; face and lip the same; clypeus edged by a black line, forming a conspicuous triangle; jaws black. Pre-anal plate, and posterior edges of the last prolegs, bright mazarine-blue, studded with the usual skin-cellules (glands?) which are here blue-black. Tubercles tinted with azure at their tips; the lowest series on the first five segments slenderer than the rest, of deep indigo hue. Feet, prolegs, and edges of all the segments, tinted with azure; two black bands surround each proleg, of which one is marginal; hindmost proleg painted with a broad ring of light scarlet, inclosing an azure area, as in the 4th age. Five days after this moult, the larva, when resting contracted to one inch and three fourths in length, is half an inch in vertical height at the middle, and one-third of an inch in transverse diameter. Crawling it extends to two and a half inches. There is an increased tendency to raise the tubercles from their imbricate recumbent position; especially in crawling, when they are nearly erected. The waxy

farina is now considerably diminished; it is still excreted, but in smaller quantity. Hence the forms and dimensions, and even the minute spines, of the tubercles, are now plainly seen; as are also the oval dark spots which crowd the entire skin, which I suppose to be the glands that secrete this flour-like substance.

One of the larvæ of this age dying, I desired to inflate it for the cabinet; and, as a preparatory measure, dropped it into a sat. sol. alum. The body floated half immersed; but, at the instant of touching the water, this waxy farina spread on the surface to the distance of one-sixth of an inch around the body, forming a pellicle; and this substance on the larva keeps it from becoming wet, like a duck's feathers.

No farina is excreted till some time after moulting. At first the tubercles are seen to be polished on their surfaces, and to be beset with very fine and short spines, not arranged in whorls. The upper and middle tubercles of the thoracic segments are aborted in this age, leaving only rugose scars.

One cannot fail to remark the resemblance between the larva of *Atlas* and that of *Cynthia*. There is the same whitish-green hue on the upper parts, becoming yellow-green on the lower; the same tendency to azure at each extremity; the same soft styli-form tubercles, which also are azure; the same minute oval glands studding the skin; and the same clothing of white waxy farina; which, in both species, becomes conspicuous in the third age, and is obsolescent in the latter part of the fifth. *Atlas* is of more clumsy shape, lacking the elegant fusiform outline of its congener: it has not the yellow extremities, nor the black specks on the sides, of *Cynthia*: but then *Cynthia* has no such ornament as the beautiful pale scarlet ring on each hindmost proleg of *Atlas*. Yet another point of agreement is the smallness of the head in these, compared with the same organ in the 5th age of such larvæ of *Antherææ* as I am familiar with, as *Yama-mai* and *Pernyi*. The propriety of Hübner's separation of *Antherææ* from *Attacus*, which had seemed slight when grounded on the imago only, is much confirmed by the consideration of the previous stages.

At the beginning of October my stock was reduced to five; but all had been some time in the 5th age, and I began to look for the spinning of cocoons. I had assumed the successive ages of the larvæ, throughout the Lepidoptera, to be limited to five. But, to my astonishment, I saw that the most advanced was

preparing for another moult, which, after four days' torpidity, was completed during the night of the 7th. I had carefully recorded all the moults, so that there seemed no possibility of error, though to me the fact appeared without precedent.*

LARVA.—6th age. (Fig. d.)

The ground-colour is now a delicate, soft pea-green, which towards the back becomes more and more white, owing to an exceedingly fine coating of the farina. The pre-anal shield is flat, thick, and horizontally extended; it is tinged with blue. All the tubercles have the form of short, soft, slender spines, beset very sparsely with minute spiculæ. These organs are of a lively azure hue, which is concealed to some extent by a coarser exudation of the farina, which clogs irregularly about them, like damp flour. The two upper tubercles on the eleventh segment are, as usual, united into one, thick, and medially placed. The middle one on the same segment is reduced to a mere wart: the lowest is normal. The prothoracic tubercles are azure, as all the rest, but are tipped with shining blue-black; the upper and middle meso- and metathoracic tubercles appear as if cut off just above their bases, each leaving a sort of wrinkled scar, of azure hue. Feet azure; the terminal joint polished black, whence a black line runs up in front of the higher joints. Prolegs azure, crossed by two bands of polished black, and terminated by a soft margin of pellucid purplish green, which carries the clinging hooks: the space between the two black bands is azure, and this space is set, at the lower margin, with a row of fine short white bristles, curving downward. The hindmost bear, each on its upper and outer portion, the usual triangular mark, which in this case is sub-

* The variation, however, is not so unprecedented as I at first supposed. Porter (Silk-manufact., p. 120) speaks of a var. of *Bombyx mori*, "which casts its skin only thrice;" and Capt. Hutton (Trans. Ent. Soc., 3rd ser., p. 299) refers to the same, which, however (p. 311), he considers a distinct species. Both refer to Count Dandolo, as their authority for the fact. M. Baviez (La Sericicult. au Japon., p. 8) says, "Les vers japonais traversent les quatre mues, à l'exception d'une race . . . qui file le cocon au bout de la troisième mue."

Burmeister (Man. Entom.; Shuckard's transl., p. 431) observes that the caterpillars of some of the larger moths moult very frequently: "for instance, *Actia callica*, from five to eight times; *A. dominula*, nine times; and *A. carya* ten times."

In the case of my *Atlas* larvæ, as I had but one that attained this maturity, I might have supposed it accidental and abnormal. But a gentleman, who also has essayed the rearing of this species from larvæ of the same brood as my own,—Mr. Thomas Edmunds, of Bedford Row,—confirms my experience. He observes, "I feel sure that mine have moulted five times, and are in their 6th age, as yours are." Mr. Edmunds mentions that he has reared two broods of *Samia Prometheus*, of both of which the larvæ moulted three times only. On the contrary, my own experience of *Promethea* gives them the ordinary number of four moults.

quadrantic, wide, and of a lovely light scarlet, or miniate, hue, the inclosed area being azure.

The spiracles are rather large, ovate, and of the same azure hue. The pro-thoracic segment has its front edge now quite smooth; whereas in the previous ages it carried four protuberant teeth, the progressive obliteration of which well marks the successive ages; for, so late as the 3rd age, these are long (as long as the tubercles), flexible and tentaculoid; in the 4th, much reduced, but still tooth-like; in the 5th, mere blue knobs; and in the 6th, wholly obliterated, or recognisable only as a slight transverse ridge just behind the collar-edge. The head is of the common light-green hue, polished, the clypeus marked by a triangular black line; the ocular patch black; lip and palpi azure; jaws black. A streak of shining black, on each cheek, is visible when the head is protruded, as in eating or crawling.

The whole skin of the upper parts, down to the line of the spiracles, is studded with those curious specks, which I suppose to be glands, more or less round, dark pellucid olive in hue, most conspicuous on the thoracic region, where they are occasionally confluent. Their surface is everywhere level with the skin, save around the edge of the pre-anal shield, where they become tiny conical warts, of a blue-black hue. The tubercles of the abdominal segments, in repose, lie flat, pointing backward and overlapping; so as, in their aggregate, to convey the impression of four bluish-white thick keels, or longitudinal ridges, along the body. In the extension of the body for crawling, they are slightly elevated, and then reveal their true character.

The four caterpillars remaining of the fifth age, now suddenly died; all of a disease of the bowels, the fæces becoming soft, clogging the margin of the rectum, and ultimately changing to a brown fluid. The solitary survivor of so numerous a family continued a fortnight longer, apparently prospering, and attaining the size and beauty which I have sought to represent in the plate, fig. *d.*; after a time, however, eating less and less, and diminishing in size. My willow tree was fast denuding; the leaves grew less attractive, less nutritive,—perhaps even unwholesome. At length, on the 20th of October, I was dismayed by observing the familiar symptoms of incipient diarrhœa, in the softened clogging fæces. I had just been reading Dr. Le Doux's valuable Memoir (Bull. Soc. Acclim., Aug. 1878) "*De l'influence de Quinquina sur les Vers à soie.*" I immediately applied Quinine to my little patient, bedewing it, *and its food-leaves*, with a very weak solution. I was gratified by seeing that it presently began to eat; that it ate freely, necessarily receiving a minute amount of the drug into the

stomach, as well as into the skin; that the feces were discharged in pellets, and became firmer. The ominous symptoms I have often seen in other species, as well as this; and I have invariably found that they have run to a fatal termination in twenty-four hours. My *Atlas*, indeed, died; but he survived these symptoms seven days, during which they certainly did not grow worse, but better; so that, *qu. val.*, my experience confirms the value of quinine in this terrible disease of our silkworms. On the last day of its life, my caterpillar both ate and crawled on his plant; but, on the morning of the 27th of October, I found him fallen to the ground, much shrunken, a drop of brown fluid oozing from the mouth; but nothing abnormal about the anus. The medicine surely arrested this; it did not preserve life, but I think it prolonged it.

COCOON AND PUPA.

My cultural experiment fell short of the desired result; but, as I began it with imported living cocoons, its cycle is almost complete. The Cocoon of *Atlas* (fig. f.) is often rudely bag-shaped, but sometimes long spindle-shaped, like that of *Cynthia*, running up above, however, into a slender cord, which embraces the footstalk of a leaf, and below dilating into a thin lamina of silk, which is spread over the surface of a leaf. Its form is in some measure determined by the concavity of several leaves drawn together, to the internal surfaces of which the Cocoon adheres. When it is wholly spun, the leaves can be readily stripped away, leaving a permanent impression of their form and neuration on the silk.

The Cocoon, omitting the cord and the lamina at the extremities, is from two to three inches in length, and about one inch in greatest width. Its colour is a light umber, or drab; its surface (independently of the impress of leaves) roughly granular, scarcely at all silky or floccose, except at the mouth: its substance thin, parchmenty, very firm; the interior very smooth, and even sub-glossy. The upper extremity forms a natural orifice for the exit of the moth, made by the convergence of a great number of silk-fibres, which are left ungummed, and are thus soft and flossy; the gummed stiff silk passing up on one side, and contracting into the cord. Thus the cocoon is not closed, like those of *Bombyx mori*, of *Telea*, of the *Anthracæ*; but open, like those of *A. Cynthia*, of the *Samia*, of the *Saturnia*.* As a result of this structure, the exit of the imago leaves no disturbance behind, no wetness, no disarrangement of these soft fibres, such as is the case with *Yama-mai*, *Pernyi*, and *Mylitta*.

* *Viz.*, of *S. pyri*, and *S. spinii*; and also of our own *S. carpini*,—save that the second converging dome-fibres of the last-named seem peculiar to this species.

The Pupa (fig. *e*) is not much longer than that of *Yama*; but it is much more bulky. My specimens measure as follows:—

	Male.	Female.
Length - - - - -	1.20 inch.	1.35 inch.
Breadth (from side to side) -	0.65 „	0.72 „
Depth (from back to front) -	0.70 „	0.82 „

In both sexes the wing-covers are very great; the superior are falcate in both; the inferior notably project. In the male the antennæ-covers are 0.35 inch broad; the pectination distinctly marked. The abdomen terminates in a short papilliform tail. The general hue is a bright chestnut, darker on the abdomen.

Looking back on the eighty larvæ which had been under my unremitting and most watchful care since the beginning of August, *with this result*, I strive to discover the cause of failure. It is not invariable. I know of only two English attempts besides my own. Mr. Edmonds began with twenty-four ova, all of which hatched, and almost all did well till the 6th age, when all died of dysentery, about the same time as my own. On the other hand, Captain Lendy, of Surbiton, beginning with twenty-four ova (of the same lot), has obtained fifteen good cocoons. This gentleman's experience is, then, of great value.

The lateness of the season at which the larvæ appear is, doubtless, the main difficulty: the increasing cold protracting the larval existence, to the weakening and exhausting of the animal. Lady Gilbert's worms passed into cocoon within less than a month from the hatching: my own lingered for more than two months and a half; Mr. Edmonds's for three months. Captain Lendy informs me that he placed his new-born larvæ in a plant-stove, in which the temperature ranged from 65° at night to 85° or even 90° by day; *and he obtained cocoons within a month from hatching*.

This points, as I judge, not to the use of artificial heat, as essential to success in England, but to a summer, rather than an autumn life. I have just obtained some imported cocoons, which I shall winter in a warm room, in hope to evolve imagines in spring; and so get ova in May, and larvæ in June, if possible,

I do not think the kind of food-plant is of vital importance. Captain Lendy is confident that the common berberry is the only proper food. Mr. Edmonds fed his with plum. Lady Gilbert extols apple. Mine chose sallow for themselves. All the *Saturniadae* seem to be very polyphagous. Whether the frequent

dew of the worms with fine spray was useful or hurtful I am not sure. I recollected the excessively humid atmosphere of the mountain-forests of India; and, considering that in my room they never felt a drop of rain or dew, it seemed that occasional aspersions were an approach to natural conditions, which might be grateful. Captain Lendy never aspersed his; but then his plant-house was doubtless damp. If I obtain sufficient larvæ in the coming summer, I purpose to attempt culture in the open air, on the common berberry, and other trees, surrounding a large branch on which the larvæ are placed, with blonde or gauze, to protect them from birds.

It may not be wholly irrelevant to add that I have already in my possession a considerable number of living pupæ in cocoons, of two other noble Indian species, viz., *Caligula Simla*, and *Antheræa Roylei*, neither of which has, so far as I know, been yet reared in Europe. The food of neither is known; but the cocoons of the latter, which are of large dimensions, are closely enveloped in leathery leaves, which Sir Joseph D. Hooker assures me are those of "*Quercus incana*, a tree which grows along almost the whole length of the Himalaya, at elevations of 5000 to 8000 feet, from the Indus to Nepâl. It does not, however, extend eastwards into Sikkim or Bhotan; nor does it descend into the plains." I gladly publish this valuable information from such a source, because others will be raising *Roylei* as well as I; and, judging from experience of other oak-eating species, we may now very confidently present to the larvæ the leaves of the English and Turkey oaks.

Whether the silk of these species and of *Atlas* will ever be of any commercial value in this country I do not know. My interest in them is that of a naturalist, rather than that of an economist; and in that capacity I venture to present these notes to the readers of the 'Entomologist.'

POSTSCRIPT.—Since the preceding article was in type, I have seen a valuable Memoir, by Dr. Chavannes, of Lausanne, "On Silk-spinning *Saturniæ* desirable to be introduced into France" ('Bulet. de la Soc. d'Acclim.' July, 1855). In a short paragraph on *Atlas*, he says:—"The silk is stronger and thicker than that of *Aurota* [which he had just praised, as far exceeding, in these respects, that of *B. mori*]; and could probably be wound to

a single thread (à un seul brin), like that of *Mylitta*. Though less rich, the cocoon of *Atlas* would yield almost as much silk as this last. The worm is the *Fagara* of China, where it has been long cultivated. . . . *Mylitta*, *Atlas*, and *Mimosa* commend themselves by the great quantity of silk which they furnish."

I hasten also to correct an error, in the earlier part of this Memoir (p. 29), by information just received from Mr. Watkins. He says:—"In January, 1876, I received about twenty cocoons each of *Attacus Atlas* and *Actias Selene*. Two of these were purchased by Leonard Marshall, Esq., who obtained, in March, 1876, a female *Atlas* moth, which is now in his possession. During the same spring I bred the remainder; but only one pair was evolved at one time, which yielded eggs that were never hatched."

EXPLANATION OF THE PLATE.

Fig. a.—Eggs of *Attacus Atlas*.

Fig. b.—Larva in first age.

Fig. c.—Larva in fourth age.

Fig. d.—Larva in sixth age.

Fig. e.—Pupa.

Fig. f.—Cocoon.

(All of natural size.)

A LEPIDOPTERIST'S GUIDE TO LYN DHURST.

By B. LOCKYER.

I VENTURE to give a few hints which, read by the light of the Ordnance Survey Maps (sold in sheets at six inches to the mile, 2s. 6d. per sheet, by Mr. Stanford, of Charing Cross) will, I trust, be found a tolerably useful guide to the macro-lepidopterist studying the fauna of this district in the New Forest. The sheets which contain the localities named in the following notes are:—No. lxiv. (district between the Southampton Road and Minstead), No. lxxi. (district between the Ringwood and Christchurch Roads), and No. lxxii (district extending from Lyndhurst to Brockenhurst Bridge and including Park Hill inclosure, &c.). Wilverley and the other large inclosures south of it are contained in sheet No. lxxix.

We will start from the eastern corner of the Northern or Minstead Road, and, taking the Southampton Road first and walking past the Beaulieu Road (the second turning on the right),

we shall find the extensive undulating heathy tract known as Matley Heath, extending a mile or so south-east along the Beaulieu Road to the railway, and intersected about a mile and three-quarters from the cross roads by Matley Rog, a running stream bordered by marshy ground; abounding, like all the numerous boggy tracts in the forest, with the fragrant *Myrica Gale* and other marsh plants, and fringed all along its course with thick alder bushes. There are some very fine willow bushes about here, but they are almost, if not quite, inaccessible.

These peat bogs are the favourite resorts of *Acidalia emutaria*, *Melanthia rubiginata*, *Leucania pudorina*, and other species, which may be taken on the wing at dusk by forming standing ground on the peat with the cut "turfs" which are nearly always to be found lying about the heaths. But, of course, a look-out must be kept for the "natives," many of whom are often oblivious of the law of assault, and might not see the matter in the same light as the collector eager to capture *Acidalia emutaria*.

The heath itself, in July, swarms with *Lycæna Ægon*, and later on *Satyrus Semele* is equally abundant. I have taken *Selidosema plumaria* here, which is, like most *Geometræ*, easily disturbed by day, and does not usually fly far or high till thoroughly seared; and am informed that *Gnophos obscurata* occurs, but after devoting a whole afternoon to the endeavour to dislodge it from the heather and gorse, returned with empty boxes, as far as this species was concerned.

Returning to the high road, after passing the last cottages on the left hand, you will arrive at the entrance to the Race-course—a small tract of heath enclosed to the north by an alder carr and peat bog forming part of "Beaulieu River." This is the great breeding-ground for *Selidosema plumaria*, and in 1873 I easily captured several dozens in two days, in lovely condition, and could have taken many more had space and time permitted. Here also may be captured *Heliothis dipsacea*, which offers by no means bad sport, as it flies with great rapidity and takes to sudden disappearances, which keep the naturalist thoroughly on the *qui vive*. Here in the spring the larvæ of many *Noctuæ* and *Geometræ* can be swept in abundance by night in favourable weather. About half-a-mile farther on you reach an enclosure of good-sized oaks. This is Lodge Hill (commonly called Lightfoots), and till 1871 as good a sugaring-ground as any near Lyndhurst. I have seen

half-a-dozen *Catocala sponsa* on one tree here: *Triphæna subsequa*, *Agrotis saucia*, and other *Noctuæ* too numerous to mention, were also taken. *Limenitis Sibylla* may be seen here, but I never found it very common. In Ashurst Wood, on the opposite side of the way, and also in Denny Wood, the next locality to which I shall ask you to accompany me, *Liparis monacha* is a conspicuous object at rest on the trunks of oak trees in July and August.

Our next day's excursion may begin by following the Beaulieu Road for a mile and three-quarters, through Matley Heath; leaving Pond Head on the right, you arrive at a path on the left, running between sandy banks and leading to a conspicuous clump of oaks and beeches, overshadowing fine holly bushes situated on rising ground: opposite this (Matley Wood) a path bordered by scattered oaks enters the road, beyond which is a sloping tract covered as far as the eye can reach with spreading forest trees. This is Denny Wait, the entrance to Denny Wood, a fine expanse of forest rather more than a mile in length, extending south to Denny Bog and Denny Lodge enclosure. *Senecio jacobæa* grows luxuriantly here. Follow the path straight down to the second cross-path, where there is a small tract of heather surrounded on all sides by the wood. All this is very productive collecting-ground in favourable seasons.

A list of all the species which may be captured here would be tedious to wade through, but I may mention that there are some small clumps of sallow along the edge of the recently enclosed part of the wood (near Park Hill Wood), on the catkins of which, *Tæniocampa gracilis*, *T. miniosa* (the larvæ of which may be beaten commonly in June), *Hoporina croceago*, &c., have been taken in the spring; that *Lithosia quadra* and *L. helveola* can be taken as larvæ along with *Cleora lichenaria* and *C. glabraria* (the two first-named insects come to sugar in July); that *Chærocampa porcellus*, *Petasia cassinea*, *Notodonta trepida*, *N. chaonia* and *Diphthera Orion* have also occurred; that *Lithosia mesomella* and *Agrotis porphyrea* frequent the patches of heather in different parts of the wood; and that I found *Melanthia albicillata* commoner here than in any of the other woods where I captured it. There are some large patches of bramble at the end of the cross-path to the right (close to the small enclosure called Little Holm Hill), round which I used to take it flitting gently, every

evening at dusk. Far from these it seldom, if ever, strayed. *Leucania turca*, *Nola strigula*, *Epunda nigra*, *Xanthia aurago*, and *Hadena contigua* are among the species to be taken at sugar; and *Calligenia miniata* is common about Little Holm Hill. I once took in this wood a solitary specimen of *Minoa euphorbiata*. Among the heather and furze in and about the newly enclosed part you may look out for *Chelonia plantaginis* and *C. villica*.

(To be continued.)

ORGYIA CÆNOSA.

By F. D. WHEELER.

I WAS interested by observing some time ago, in the 'Entomologist,' an article by Mr. T. Eedle on the disappearance of this species from Wicken Fen, shortly followed by a notice of its capture there this season by Mr. G. T. Porritt. Mr. Eedle attributes its scarcity to the floods of the winter 1875-6, in which I cannot agree with him; but before entering into these surmises, perhaps it may interest some collectors to whom the fens are "terra incognita," if I give a short sketch of my acquaintance with this insect.

I first visited Wicken Fen in 1872, when I had somehow acquired the notion that *Macrogaster arundinis* was a thing of the past, and *Orgyia canosa* almost so. This was confirmed to some extent by the fen-men, who told me they could no longer obtain larvæ or pupæ of the latter, though the former was occasionally met with as an extreme rarity. That season I was not fortunate enough to secure either, but in 1873 I first formed acquaintance with both by means of the "attracting lamp,"—a method of collecting which for fen-work simply eclipses all others. *Canosa* first occurred on July 25th, 1873, and on the night of July 28th, as many as ten specimens came to the lamp. In all, upwards of fifty fell to my net that season, all male, of course, though my friend Mr. W. H. B. Fletcher took one female at rest. They flew between about 11 p.m. and 2 a.m., greatly resembling *Liparis auriflua* on the wing, but with a softer flight, and were easily netted. Next year (1874) I was staying throughout the months of July and August within six miles of Wicken Fen, and visited the ground regularly every other night. The weather was

most favourable for collecting, and insects simply swarmed: to my great disappointment, however, *Cænosa* was not among the crowd—only four specimens came to the lamp. In 1875 my friend Mr. Richardson took my place at Wicken, working the ground with the utmost care, yet he succeeded in taking but eight *Cænosa*, and this has been about the average yearly catch since then.

Of the larvæ I have seen three only, all of which I found upon the sedge (*Cladium Mariscus*) which forms the chief growth, and indeed the "crop" of Wicken Fen. As far as I have been able to gather from the sedge-cutters, this seems to be its usual food-plant, though probably reed and other herbage may enter into the category.

Before generalizing from these facts, I should like to mention similar instances of two other species:—

Callimorpha dominula used to swarm at Wicken: on May 7th, 1873, Mr. Fletcher and I collected in a few hours five hundred and eighty-two larvæ, almost all from one patch of dwarf willow, and could have taken hundreds more without stirring twenty yards—there must have been very many thousands in the square mile or so constituting Wicken Fen. The species is still there, but in very diminished numbers: the very next season, happening to want a few larvæ, I was quite five hours in collecting three dozen. I may mention that a good number of these *Dominula* were turned out at Ranworth Fen, in Norfolk, but do not appear to have thriven, for I never saw it there since.

Leucania phragmitidis was also abundant in 1873: we could have taken almost any number feeding on the flower-heads of various grasses, and in fact did secure fine series, showing a beautiful pink hue—far more so than Norfolk specimens. In 1874, however, the species was quite a rarity, and seems ever since to have been singularly scarce for so usually common a fen insect. All these facts tend to show that, from some cause or other, the winter of 1873-4 was especially fatal to some of the Wicken insects. According to theory it should have been very wet, with heavy floods, but in fact the reverse was the case. In 1872-3, Wicken was quite covered, the willow-bushes alone standing above the expanse of floods, yet after this *Dominula* was so abundant, as I have narrated, more so I believe than has been the case for some years. The following winter was comparatively

free from floods, and the spring of 1874 peculiarly early and dry. On the whole I am inclined to attribute the falling off in *Cænosa* and other species to directly opposite causes. For many years Wicken Fen has been gradually becoming *dryer*, so much so that the sedge-crop now takes longer (I am informed) in coming to maturity than was once the case: may it not be this influence which, in stunting the luxuriance of the fen vegetation, is gradually rendering it unsuitable for the nourishment of the larvæ? It is not easy to find a good-sized reed (*Arundo Phragmites*) in the fen, except among those growing in the ditches, and this has a curious effect upon *Macrogaster arundinis*, which runs very small as compared with Yaxley specimens. I have seen one or two good-sized ones from Wicken, but most of them are exceedingly small, especially the females. . It is interesting to find that this extraordinary insect does not appear to be decreasing in numbers: it is far from abundant, but I cannot learn that it ever was so at Wicken—certainly not in my recollection. It is, therefore, some comfort to think that although *Cænosa* be fast following in the steps of *Nonagria concolor*, we are at least likely to retain for this generation the most singular and interesting of the lepidopterous fauna of our fens.

Chester Place, Norwich, December, 1878.

A NEW MACRO-LEPIDOPTERA.

By J. H. THRELFALL.

NEPTICULA LAPPONICA, Wocke, A SPECIES NEW TO BRITAIN.

I sent a short time ago some *Nepticulæ*, which appeared strange, to Mr. Stainton for identification, and he has just returned them as *Nepticula lapponica*, Wocke. They are closely allied to *N. sorbi*, but "have the fascia less oblique, more yellow, and generally broader." The larvæ feed in broad serpentine mines in birch, are light yellow in colour when full fed, and are to be found at the same time as *N. betulicolella*, viz., October 1st to 20th.

[*Nepticula lapponica* appears to be either a scarce or overlooked species on the Continent, for Wocke only records it from Lapland and Finland. This makes Mr. Threlfall's discovery especially interesting.—Ed.]

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY.

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No. XI. NYMPHALIDÆ.—NYMPHALINÆ.

(Species allied to EUNICA.)

WE have now reached an extensive series of genera, the greater number of which are exclusively confined to Tropical America, of which they are highly characteristic. The typical species of *Cybdelis* measure about an inch and a half in expanse, and the hind margin of the fore wings projects slightly below the tip, and is slightly concave below the projection. The hind wings are scalloped; the hind margin curving strongly outwards in the middle, and then sloping more or less towards the anal angle. The typical species, *C. Phæsyle*, is reddish brown, with the apical half of the fore wings black, marked inside with a white band on a rich purple ground, and more or less broken into spots; towards the tip are two more small white spots. *C. Muasylus*, the commonest species, is of a rich brown, with four white spots on the fore wings—two at the tip, and two larger ones slightly surrounded with lilac, one on the costa, and another above the hinder angle. The hind wings have a large white spot in the middle, broadly surrounded with lilac; and there are one or two reddish submarginal lines on the hinder half of the wing. I think it probable that several species which I placed in *Myscelia* in my Catalogue, but which Mr. Hewitson placed in *Cybdelis* (in which genus he also included *Eunica*) would come better with the present genus. I refer to *C. Campaspe* and allies, which much resemble the genus *Perisama* in the markings of the upper side, though the wings are denticulated; and the hind margin projects slightly below the tip of the fore wings. They are velvety black, with rich green or blue radiating basal stripes on the fore wings, at least in the cell, beyond which is a broken row of spots of the same colour. The outer half of the hind wings is also frequently remarked with a large spot or short band. The basal portion, at least, of the under side of the fore wings is marked with a rich crimson. The hind wings are light brown beneath, with a white dot in the middle; and some indistinct lines. *Cyclogramma Pandama* is an insect of similar

size, but the hind margin of the fore wings is nearly entire, and is slightly concave below the middle. It is brown, and the fore wings are marked with an orange band, running from the middle of the costa obliquely to the hinder angle; outside this, the wing is black, with a white spot towards the tip. The orange band is replaced by a reddish one beneath; and the red colour extends nearly to the base. The hind wings are brown, with a zigzag black line near the base, and two others towards the hind margin; between these are four black rings, placed two and two.

There is a small African genus, *Crenis*, which represents *Eunica*. They expand two inches, or a little more or less. The fore wings are rather long, which makes the hind margin somewhat oblique; and the hind wings are slightly scalloped. They are brown or tawny, with the costa and tip of the fore wings black; sometimes the upper side is uniform dark brown, or is shot with violet-purple. The under side of the hind wings has always a more or less conspicuous, though continuous and regular, row of small eyes, but otherwise differs considerably; thus, that of *C. Drusius* of South Africa (the smallest species) is marbled nearly as in an *Hipparchia*, with the eyes well marked; that of *C. Madagascariensis* is silvery grey, the eyes being hardly visible; and that of the beautiful violet *C. Amulia*, from West Africa, is orange yellow, with the eyes, and two broken transverse black lines nearer the base, bordered with bluish grey.

The large South American genus *Eunica* contains a number of species varying from one and a half to nearly three inches in expanse. They are nearly all brown or velvety black, often more or less suffused with blue, purple, or violet, sometimes on the fore wings only, sometimes on the hind wings only, and sometimes on both; or the colour may be confined either to the base or to the borders of the wings, and is sometimes confined to the male. Many species are spotted with white on the outer half of the fore wings; and *E. Margarita* differs from all the rest in being silvery white above, instead of brown or purple, with the tip broadly black, spotted with white, and a double row of marginal dark spots on the hind wings, the outer ones round, and the inner ones securiform. The outline of the wings is very various, but is generally dentated; and the tip of the fore wings is frequently truncated. The under side of the hind wings is

always marked with a row of eyes beyond the middle, but this varies very much in distinctness. Sometimes, as in *E. Pomona*, there is a long black eye with two bluish white pupils near the tip, and a smaller one with one pupil near the anal angle; in *E. Caresa* the eyes are represented merely by inconspicuous pale spots; and in *E. Margarita*, nothing is visible on the mottled brown surface but two or three white pupils. In some species, as in *E. Maia*, the pupils of the eyes are green. Still the eyes are always more or less visible, in spite of their variability, and the genus is easy to recognise.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LYCÆNA BÆTICA IN THE ISLE OF WIGHT.—I have a specimen of this butterfly which was taken either by my brother or myself near to Freshwater, on the 23rd August, 1878. We were in want of "Blues," and netted every one we saw. The specimen is a male, but is in bad preservation, owing partly to our not knowing its rarity.—C. D. SNELL; 56, Jeffrey's Road, Clapham, S.W., February 10, 1879.

[Mr. Snell has very kindly allowed me to inspect the specimen of *Lycæna Bætica* above adverted to, and has also written me a letter giving a more explicit account of its capture. The insect is common in South-eastern and South-central Europe, and in favourable seasons it is found moderately common on the northern coast of France and in the Channel Islands. Three specimens have been taken in Belgium, one at Louvain, one at Visé, and one at Namur. Two specimens only have hitherto been recorded as having been captured in England. The larva feeds in the pods of *Colutea arborescens*, the common pea, and and other *Leguminosæ*: my acquaintance with the species in a state of nature is slight. I took the insect on the right bank of the Rhine, close to the bridge at Coblenz; it was there in the month of August flying over a piece of waste ground sparsely clothed with vegetation consisting principally of *Ononis arvensis*, in the turgid legume of which plant I have no doubt the larvæ had fed. I am inclined to think that the species may in some sunny spots in our southern counties be a permanent resident; it should be sought for on banks with a slope to the south, where any species of the genus *Ononis* grows in profusion; it might

also be found on any leguminous plant which has a turgid legume,—*Genista anglica* for instance,—but I think the larva could not exist except on plants which have these swollen pods, as it feeds inside the legume. The species when on the wing might be easily passed over as a specimen of *Lycæna Icarus*, and it is to this cause that I attribute the fact that it often happens young collectors who capture nearly every species they see on the wing are often rewarded, as in the present instance, by taking a great rarity, which would have escaped the notice of an older entomologist, who had long since obtained a full series of common species.—J. JENNER WEIR.]

PROTECTIVE HABIT OF THE LYCÆNIDÆ.—It is a trite remark that butterflies not otherwise specially protected generally prefer to settle on objects, the coloration of which closely approaches their own. Last August, in the Chiltern Hills, I noticed *Lycæna Alexis* haunting by preference a very common white umbelliferous flower (which my ignorance of botany does not enable me to name), whose florets have small intervals between them, so that when seen from a little distance it has an ocellated appearance. When a blue settles on this flower and closes its wings their ocellated under surface becomes almost invisible, unless you see the insect move.—J. W. SLATER; 3, Bicester Road, Aylesbury.

ACRONYCTA ALNI AT TORQUAY.—While staying at Torquay in the middle of August of last year, I obtained a full-fed larva of *Acronycta alni*, but it was unfortunately killed with the beating-stick.—C. WINN; Aldin House, Slough.

CRYMODES EXULIS AND HADENA ASSIMILIS.—I should be glad if any person can throw light upon the identity or severance of the two above-named species. I do not profess to be a learned entomologist, nor wish in my note to enter upon the details of the appearance of these insects, of both of which I believe I possess a specimen. I suppose they are still assumed to be identical. Newman figures both (among those very beautiful illustrations, whose accuracy, as a rule, even suggests the very colouring of the creature in a way no other illustrations I ever saw have succeeded in doing), still he says he cannot distinguish them,—and yet his drawings are widely divergent; and the drawing named *Hadena assimilis* is very dissimilar from *Hadena adusta*, from which I believe it gets its specific name; whilst his

Crymodes exulis is very similar to *H. adusta*. I speak more of the general effect than details, and most of the outline, which in Newman's *H. assimilis* is of the proportions of *Cerigo cytherea*; next to which genus in some lists is classified, however, not *H. assimilis* of Newman, but *C. exulis*. I have but one specimen of each; but the one marked *Exulis* is of the shape of Newman's *Assimilis*, and I have it placed next to *Cerigo cytherea*, while the one I believe to be *Assimilis* is similar to *Adusta*; it is, however, a female, and lacks the bright red line conspicuous in the male, and which I have heard fades after a time, which also may account for Newman mentioning no such distinguishing a stigma, whether in his description of *C. exulis* or of *H. assimilis*. In Scotland, last June, a very energetic and obliging collector pointed out to me the very tree on which two years ago he took a male *Assimilis* with the bright red line, at sugar: he said "you will probably take *Exulis* before you leave." Accordingly on July 9th, within fifty yards of the tree pointed out to me, at my sugar was captured a very beautiful moth, at first supposed to be *H. adusta*, apparently but just emerged; but at that time *Adusta* was quite over-worn. On careful daylight examination we came to the conclusion that it was a female *Assimilis*; and this has been decidedly pronounced to be the case by your well-known correspondent Mr. Hodgkinson, of Preston. As I said, I describe only its general appearance: and it appears to me to be a little smaller, narrower in the wings, and of a far richer and more velvety appearance than any *Adusta*; it is also darker than even the dark *Adusta* taken near Kinloch, Rannoch, which seem to me to be, as a rule, darker than those taken at Croiscrag, only eight miles off, near the other end of the lake. At sugar it sat with its head pointing up the tree, and its wings quite closed, which I believe not to be habits with *Adusta*. It was one out of seven insects taken at sugar during thirteen nights, the other six being *Triphæna pronuba*, *Hadena adusta*, *Rusina tenebrosa*, *Noctua plecta*, *N. conflua*, and *Hadena pisi*. On one occasion five collectors were out on the same night and did not see a moth. *Acronycta myricæ* was altogether absent there in 1878. This extraordinary record in the annals of sugaring I have been much surprised to find has been passed over with scarce notice in the magazines. I left Perthshire, July 15th, and I heard that there was no improvement in this matter during the season of *Aplecta*

occulta and *A. tineta*; although on my return to Lancashire my garden trees swarmed with moths at sugar, amongst which I took a black *Xylophasia polyodon*, almost as velvety as *H. assimilis*.—[Rev.] T. GREGORY SMART; Lytham, February 7, 1879.

SOME VARIETIES OF *PACHNOBIA HYPERBOREA*.—I possess some specimens of *Pachnobia hyperborea (alpina)*, which were bred by Mr. Clark, of Rannoch, and which are of singular beauty. No. 1 is dark chestnut-colour; markings very distinct. No. 2, deep Vandyke-brown. No. 3, grey; rich chestnut bands. No. 4, blue-grey, with quite black stigmata. No. 5, straw-coloured grey, with amber blotches and no dark marks; careful painting alone could represent their delicate or rich beauty.—ID.

INSECTS TAKEN AND BRED IN 1878.—April 20th, one *Gelechia juncitella*, beaten from willow at Witherslack. April 24th, larvæ of a *Gelechia* found at Lytham, roughly described as follows:—Dark grey, with red spots; feeding in sand cocoons at roots of *Cerastium* and *Stellaria*; produced, July 6th, a little *Gelechia*, which Mr. Stainton pronounces to be new, and allied to *G. Knaggsiella*. More must be bred before naming. April 29th, *Micropteryx Sparmanella* and *M. Salopiella*, at Witherslack, flying in the afternoon sun. April 30th, a larva of *Diplodoma marginepunctella*, at Witherslack; fed on larvæ of *Triquetrella*, and emerged June 20th. The *Triquetrella* all emerge females, and are very plentiful. July 6th, larvæ of *Depressaria capreolella* in *Pimpinella saxifraga*, not in radical leaves, but high up the stems; green, black head: all sent to Mr. Sang, who bred them later. July 6th, larvæ of *Nepticula betulicolella* in small, contorted galleries, in birch, filled with brown excrement; larvæ bright yellow; produced imagines August 15th. July 24th, larvæ in cones of birch; green and horny-looking; produced five imagoes of *Gracilaria populella* from July 28th to August 1st. August 19th, cones on *Polygonum hydropiper*, found on this date, produced *Gracilaria phasianipennella* from September 1st to 10th. This and *G. populella* are very much infested with ichneumons. August 19th, a pupa spun up in the hollow of a *Carex* blade, and covered all over with a thick white web; is expected to produce the long-wished *Elachista serricornella*. August 20th to October, many larvæ of an *Elachista*, supposed to be *Ochreella*, were found in a long stiff grass; plentiful at

Witherslack on the wet mosses; described roughly as blackish, reddish brown head, and generally mining up. September 7th to October, larvæ of *Elachista teniatella* found in plenty in *Brachypodium sylvaticum* at Grange. August 19th, I think that this was the date when I took plenty of imagos of *Glyphipteryx schœnicolella* on the wet mosses at Witherslack, but being mistaken for *Fischeriella* at the time no date was put down. October 5th, plenty of larvæ of *Nepticula æneofasciella* in blotches in leaves of agrimony at Grange. Can any one send me larvæ of *Nepticula agrimoniella* in exchange for these? October 5th, after great difficulty I found on this day a few larvæ mining in *Festuca ovina*, and described as slaty brown, which are no doubt those of *Elachista dispunctella*. This confirms what I formerly said about this insect,—that it would be an autumnal feeder, would hibernate in old grass-stems, and change late in spring. In June, 1876, a larva was found, and described as greyish yellow, which produced an imago, July 8th.—J. H. THRELFALL; Preston, Feb. 3, 1879.

NOTE ON AQUATIC DIPTEROUS LARVÆ.—Whilst making some observations on the animal life present in, and characteristic of, polluted waters, I was struck with the fact that dipterous larvæ, such as gnats (*Culicides*) and midges (*Cheironomides*), are far from being, as commonly supposed, valuable sanitary agents. A popular modern author writes: "Even in our ponds at home we are much indebted to the gnat larvæ for saving us from miasma." But in numerous experiments and observations made during the past summer, I invariably found that gnat larvæ, blood-worms, &c., intensified putrefaction, and caused the decomposition of organic matter dissolved or suspended in water to take a more malignant type. The excreta of these creatures appear to me to contain in fact a powerful ferment, though I hope to examine further into this question during the next season. As regards the blood-worm (*Cheironomus plumosus*), I observed that in water containing dense layers of confervæ it forms itself a tube or cell, by boring into these growths. If placed in a glass only sparingly coated with confervæ, the larva forms tubes by collecting together granules, as described by Mr. E. Cox in the 'Entomologist' for December (Entom. xi. 261). On putting a single blood-worm into a glass I found that it made six or seven distinct cells, inhabiting sometimes one and then another.—J. W. SLATER; 3, Bicester Road, Aylesbury.

FREDERICK SMITH.

BORN, December 30th, 1805.

DIED, February 16th, 1879.

Honest and thorough in his work; kindly and genial when the outer crust was broken through; possessed of great knowledge, and ever willing to impart it;—he leaves a gap not readily to be filled.

He shall return no more to his house; neither shall his place know him any more.





Believe me

Yours very truly
Frederic M. Smith

THE ENTOMOLOGIST.

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[No. 191.]

BIOGRAPHICAL NOTICES.

No. III.

FREDERICK SMITH.

THOUGH born in London, on the 30th December, 1805, the subject of this notice was a son of Mr. William Smith, of Water Fulford, near York, and was educated at Leeds. When his school-days were over he was apprenticed to Mr. W. B. Cooke, an eminent landscape engraver, in Soho Square, who had lodging with him a nephew, William Edward Shuckard, then apprenticed to a firm of booksellers in Paternoster Row. The two lads occupied the same room; and thus commenced a friendship which lasted till Shuckard's death. At this time neither of them exhibited any partiality for Entomology; but after several years Shuckard returned to his native town of Brighton, "and having much time on his hands he used to employ it in rambling over the downs, and on one occasion while there his attention was by mere accident attracted by some insects scrambling up a sandy bank. One of these he caught; it was *Cicindela campestris*; he admired its beauty, went again and again to the downs, and there, on the sandy banks, saw bees burrowing. His hymenopterous studies dated from these solitary rambles on the Sussex downs. He soon afterwards procured a copy of Kirby's 'Monographia Apum Angliæ,' and from this time his whole energies were devoted to Hymenoptera." (Entom. iv. 182.) The future author of the 'Essay on the Indigenous Fossorial Hymenoptera of Great Britain' soon won over his friend to the same

pursuit; and while still a young man Frederick Smith had become an ardent collector of bees and ants, and a close observer of their habits.

In those early days his favourite collecting ground was Hampstead Heath, but by degrees he extended his researches to Lowestoft and Southend, to Deal and Weybridge, to the Isle of Wight, and many another sandy district in the South of England, until he acquired an unprecedented acquaintance with our indigenous species. Nor did he confine himself exclusively to Hymenoptera, for he made a collection of Coleoptera also; and in the days when John Walton flourished he paid especial attention to the Rhynchophora. On the death of Mr. Bainbridge in 1841, he was appointed to the office of Curator of the Collections and Library of the Entomological Society of London. This post he filled for nine years, or thereabouts; and on every Monday during that period he was to be found at the Society's Rooms, in New Bond Street.

As pupil first and afterwards as assistant to Mr. Cooke, Frederick Smith contributed to many of the works which were published by his master, including a considerable number of engravings of important pictures by Turner, Constable, and David Roberts. But having been engaged by Dr. Gray to arrange the British Museum Collection of Hymenoptera, he was employed upon this work at the time when a vacancy in the Zoological Department was created by the death of Edward Doubleday, in December, 1849. Shortly afterwards Frederick Smith was appointed one of the permanent entomological staff of the Museum; and thenceforward he abandoned art for science, and relinquished engraving as a profession. But he engraved, from Westwood's drawings, the plates of Wollaston's '*Insecta Maderensia*' (1854); and all those plates which illustrate the British Museum Catalogues of Hymenoptera, and his own papers in the Transactions of various learned societies, were drawn and engraved by himself.

At a meeting of the Entomological Society held on the 3rd April, 1837, Mr. Ingpen read a letter from Mr. Smith, giving an account of the natural history of one of the *Cynipidæ* which inhabits the small flat galls on the under side of oak leaves (Proc. Ent. Soc., 1837, p. xliii). This, I believe, is the first published notice of Frederick Smith's observations. On the 2nd September,

1839, he read before the same Society some notes on the habits of British ants, which, however, were not printed until 1842 (Trans. Ent. Soc. iii. 151). From 1842 to the time of his death his publications were unceasing; and some idea of his activity may be gathered from the fact that the Royal Society's Catalogue of Scientific Papers enumerates no less than ninety-seven prior to 1863, the chief of which appeared in the 'Annals and Magazine of Natural History,' the 'Zoologist,' the 'Transactions of the Entomological Society,' and the 'Proceedings of the Linnean Society.' During the last fifteen years the stream has continued to flow on; and it is probably within the mark to say that at the time of his death there had appeared from Mr. Smith's pen, in the various scientific publications, not less than one hundred and fifty entomological papers, many of them monographs of high importance, all of them containing something that was worthy of record. To these must be added the works compiled by him for the Trustees of the British Museum, including the Catalogues of British Hymenoptera (with sixteen plates, 1855 and 1858; a second edition of the *Andrenidæ* and *Apidæ*, in 1876), and the Catalogues of the Hymenopterous Insects of the whole world (seven parts, with thirty-seven plates, 1853 to 1859),—works which, under the modest title of Catalogues, in addition to the synonymy, contain detailed descriptions of hosts of new species, and notes on habits and economy.

Elected a member of the Entomological Society in 1850, he was one of the most constant in his attendance, and for many years served on the Council. He was President in 1862 and 1863, was repeatedly a Vice-President, and had been re-appointed to that office only a fortnight before his death. All who have been in the habit of frequenting the meetings of the Society will remember his never-failing readiness to impart his knowledge to others; and whenever he was appealed to on any question connected with our indigenous Hymenoptera he had always something valuable to communicate, not taken second-hand from others, but the result of his own personal observation.

With regard to exotic species it may perhaps be doubted whether he kept himself sufficiently acquainted with all that was being done by his contemporaries abroad; but as regards the British Hymenoptera he was for the last quarter of a century without a rival. An accurate observer, he has done much to

advance our knowledge of the group; a painstaking describer, he has laid foundations that will serve for future classifiers to build upon. Regular and methodical in his habits, patient and persevering, laborious and industrious,—like his favourite ants and bees,—he plodded on, piling fact upon fact, and adding to his ever-increasing store of knowledge. His writings may not be characterized by the polished style of the 'Monographia;' yet, in his way, Frederick Smith was a worthy successor of William Kirby; and it is to be hoped that his collections of Hymenoptera will find a home, side by side with Kirby's types, in the great National Institution which for more than eight and twenty years he served so well.

Unassuming in manner, retiring and somewhat reserved with strangers, Mr. Smith was warm and affectionate at heart; possessed of a quiet sense of humour, he had a capacity for entertaining others which was probably unsuspected by the generality of his acquaintances, and was known only by those who have met him in the unrestraint of social gatherings. Of simple tastes and thoroughly domestic habits, he was devoted to his family, and in turn beloved by them. A widow and four children survive to lament his loss.

Mr. Smith died on the 16th February, 1879, from exhaustion consequent upon the operation of lithotripsy. His last resting-place is in Finchley Cemetery, near the hunting grounds of Hampstead and Highgate, where so many happy days of his peaceful and uneventful life were spent. His colleagues have lost a faithful friend, the public a conscientious servant, and Entomology an earnest and indefatigable votary.

J. W. DUNNING.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. XII. NYMPHALIDÆ.—NYMPHALINÆ.

(Genera allied to CATONEPHELE and DYNAMISÆ.)

THE genus *Epiphile* contains several handsome species from Tropical America, expanding a little over two inches. The fore wings are rather truncated at the tips, with a projection on the upper part of the hind margin, below which the wing slopes off to

the hinder angle in a rounded concavity. The hind wings are rather long, with the hind margin dentated. The wings are rich brown or black, with orange oblique bands sloping outwards from the costa of the fore wings (always well-marked below), and sometimes produced on the hind wings. Sometimes the greater part of the wings, or only the centre of the hind wings, are suffused with rich blue above. The under side of the hind wings is dull brown, with a rather indistinct row of eyes; towards the tip of the fore wings is a more distinct eye, generally indicated by a white dot above. But all the species have a more or less triangular yellowish white or slightly silvery mark on the costa of the hind wings beneath.

The type of the next genus, *Myscelia Orsis*, a common Brazilian butterfly, has a strong projection below the tip of the fore wings, and the hind wings are rather strongly dentated and nearly square, the strongest tooth being nearly opposite to the anal angle. The male is of a dark purplish blue, with the tip and hind margins black, shading here and there into dull reddish, a large oblong black patch below the cell of the fore wings, and the hind wings denuded of scales on the costa to below the cell. The basal half of the costa of the fore wings is narrowly reddish, and there are also some pale spots partly representing the markings of the female, which is black, the fore wings with a white basal stréak, and two others running obliquely from the costa across the cell, beyond which is another row of spots running from the costa, and dividing opposite the projection on the hind margin, one row running to the hinder angle and another to the middle of the inner margin. Corresponding to these, are an inner white stripe and an outer row of spots on the hind wings, which are also marked with a bluish stripe towards the hind margin.

The next genus, *Catonephele*, is closely allied to this; but it is specially remarkable for the great disparity between the sexes. The species vary in size from two inches to three and a half; the hind margins of the fore wings are oblique, and those of the hind wings rounded and more or less scalloped. The fore wings of some of the females, however, are deeply concave below the middle of the hind margin. Many of the species are very common in Tropical America.

C. Obrinus is black, with a broad blue band across the fore wings, and a broad orange band across the hind wings. The

female is brown, with an additional blue spot on the costa of the fore wings near the tip, and one or two red spots bordered with black in the cell; the hind wings have three obscure narrow black stripes, the outermost sometimes marked with one or two blue spots, and having a row of black spots within it. The males of the other species are of a rich black, with a broad orange band, differing in shape and size, running across both wings, which is sometimes divided towards the tip of the fore wings, or else reduced to two large spots. The females generally resemble that of *Myseelia Orsis*, but the pale markings are sulphur-yellow, and there is a reddish spot below the tip on the fore wings and at the anal angle of the hind wings. The females of other species are black, with a yellow transverse band on the fore wings, and some rather indistinct yellowish macular stripes towards the hind margins of all the wings. The butterflies frequent forests, and the larvæ are armed with branching spines.

Temenis Laothoë is a very variable species, expanding two or two inches and a quarter across the wings. The hind margin of the fore wings is concave below the tip, and the hind wings are slightly dentated and rather oval, sloping off to the anal angle. They vary from pale tawny, with the tip of the fore wings brownish and blotched with tawny, and a black dot towards the anal angle of the hind wings, to rich tawny or orange, with the tip black, glossed with purple, and marked with orange; and sometimes the hind wings have a purple border varying in width, or are glossed with peach-colour over the orange; or may even be wholly blackish, with a white dot instead of a black one. The under side of the hind wings is brownish, glossed with purplish, with an incomplete row of small submarginal eyes, with black and blue pupils, and there are some white blotches on the costa of the hind wings. The larva is covered with branching spines, and has two very long ones on the head. It is common in South America.

The genus *Nica* resembles this, but the fore wings are broader in proportion and but slightly concave, and the hind wings project a little in the middle, making them more square. The species, too, are smaller, measuring only an inch and a half in expanse, or a little more. They are orange-tawny, with the tip of the fore wings blackish, with a yellow spot (*N. Flavilla*, from Brazil), or broadly black with (*N. sylvestris*, Upper Amazons), or without

(*N. Canthara*, Venezuela), a white spot. The under side is paler, with a broad reddish brown transverse stripe, bordered with bluish white on the inside on the hind wings, and on the outside on the upper part of the fore wings; outside this are two white spots, more or less surrounded with black near the costa of each wing, and two very small ones near the anal angle of the hind wings, represented on the upper side by black dots.

Peria Lamis is a scarcer South American butterfly, nearly resembling *Nica* in shape and size, but with rounded and less denticulated hind wings. It is of a uniform dark brown above, and dull yellow below, marked with a transverse reddish brown stripe, outside which is a row of small black dots on the hind wings. The fore wings are marked below with two dots near the tip and one in the cell.

We now come to the rather extensive South American genus, *Dynamine*, which includes the smallest species of the true *Nymphalinae*, some of which do not expand more than an inch, while the largest scarcely exceed an inch and a half. Some species are white, with the tip of the fore wings broadly brown or black, and marked with one or more white spots, and the costa is broadly dark, and frequently greenish or bluish. The hind margin of the hind wings is also dark, and there is sometimes a dark transverse stripe in the middle, extending to the inner margin of the fore wings. On the under side the dark portions of the wings are lined and blotched with reddish and bluish grey. In other species the males are bluish, greenish, or brassy, with dark borders, and sometimes large dark spots on the fore wings, and the females are brown (sometimes bluish towards the base), with from one to three white bands on the hind wings, and white spots on the outer half of the fore wings. On the under side of the hind wings are two large black eyes, with blue pupils and yellow rings, placed on a reddish band, edged with white on both sides. In other species the males are bluish or greenish, spotted with white, with the tip and hind margins black, and sometimes a second black band on the hind wings, within the border. The females are black and white, and the under sides of the hind wings are silvery grey, with transverse or submarginal reddish lines or stripes, often bordered with black; but without eyes. These pretty little butterflies are found flying about bushes, or at the edges of woods.

In my next paper I shall treat of *Catagramma* and its allies, which form one of the most beautiful and characteristic groups of South American butterflies.

A LEPIDOPTERIST'S GUIDE TO LYNDBURST.

By BERNARD LOCKYER.

(Continued from p. 78.)

WE will now leave the umbrageous shades of Denny Wood (very nearly sacrificed to the woodman's axe, some years since, by the orders of the Government Surveyor, but saved to the public through the generous exertions of Lord Henry Scott, of Beaulieu), and returning to Lyndhurst, take the easternmost of the three roads running south through the cultivated tract round the village. We pass Foxleaze Terrace on the right, and at the end of the first half mile cross a bit of ornamental water running through Foxleaze Park. Just beyond this a lane opens out on the left, leading to a broad grassy path (Beechen Lane), having on the right Park Ground Inclosure, and on the left Pondhead; both these are inclosed by ditches and wooden palisades, overgrown with lichens (the favourite resting-places of *Cymatophora ridens* and various *Geometræ*, &c.) Along the palings is a good growth of sallow, wild rose, and other shrubs (the resort in spring of *Anticlea badiata*, *A. derivata*, &c.), and at the end of the path you find yourself in an open tract of forest, extending along the north-east boundary of Park Hill Inclosure to Denny Wood, and called Park Hill Wood and Botley Field. It was here that, in August, 1874, I thrashed out of a beech tree a juvenile larva of *Acronycta alni*.

Several gates open out of both inclosures. Enter Pondhead by the first you come to, which leads straight through the inclosure to Park Hill private grounds. Here I have taken both the imagines and larvæ of *Lithosia aurcola*. The other species occurring here are common to most of the older inclosures, so I will not further mention them. Returning to the main road, follow it down, passing the hamlet of Clay Hill on the left, just beyond which you will see the Keeper's Lodge at the entrance to Park Ground (or Jones's) Inclosure. Opening the gate you enter a broad path, lined with oak trees and bushes; on the

ground a mass of bracken, bramble, primroses, wild violets, &c., and (past the end of the entrance ride) perfectly carpeted by trailing honeysuckle, here and there forming luxuriant festoons and bowers amongst the other undergrowth, which in the denser parts of the wood includes much fine sallow, a good cover for larvæ of *Apatura Iris* and *Stauropus fagi*. *Pericallia syringaria* frequents the honeysuckle. At the right hand corner of the first cross ride *Lithosia mesomella* and *Epione advenaria* occur, together with an occasional *Coremia propugnata*. *Phorodesma bajularia* and *Acidalia trigeminata* are common, the latter coming freely to sugar. In and beyond the cross path the oak is interspersed with tall fir trees, which I found in 1875 to be the favourite resting-places of *Tephrosia consonaria* and *Boarmia roboraria*. Both species rest at some height from the ground, and seldom give a second chance of capture when dislodged. They fly wildly; and *B. roboraria* (which is best taken in the early morning, and which comes to sugar late at night) is only to be taken plentifully by the aid of a long pole, like that used to capture *Apatura Iris*. The whole wood is a capital sugaring ground; and, in 1871, I captured here most of my *Triphæna subsequa*, together with crowds of other species, many of which, however, did not occur there again. *Lithosia complana*, *Boarmia repandata* (var. *conversaria*), and many other *Geometræ* visit the sugared trees, and in the autumn *Noctua glareosa* puts in an appearance.

Almost enough has, perhaps, been already said and written anent the gay butterfly denizens of this (to the student of Nature at any rate) attractive wood; I will, therefore, only add that the deliciously cool and shady nature of the rides where they occur most prolifically, renders this a pleasant, as well as productive, retreat in which to observe their lively and elegant evolutions. On the most tropical of summer days, only broken gleams of sunlight penetrate through the canopy of leafy boughs overhead; so that a chase after the maddest of males, scared from his nectar-sipping among the blackberry bloom, or from amorous gambols around some recently arrived coquette of the opposite sex, does not result in the overheated fatigue produced by a scamper after an *Argynnis* in the open rides of the newer inclosures.

If, instead of following the cross drive to the gate leading into the open tract facing the high road (Clay Hill Heath), you

take the first ride to the left and follow it to its outlet, you will see, across the rough ground, the rails of a large inclosure of young fir trees, surrounded with furze and birch bushes, &c. This is Park Hill Inclosure, and one of the most extensive in the forest. Keep to the right, enter the first gate and follow the ride to the first cross path, where turn to the left, and you are on the collecting ground for many of the New Forest specialities. This is a very broad grassy ride through the inclosure, planted on either side with small oaks and firs alternately, with occasional larches, and here and there an ancient forest tree left standing *in situ*, interspersed with large clumps of bramble, &c.; the various grasses common to the forest occurring, together with plants of heather, *Centaurea*, *Lotus*, *Hippocrepis*, *Scabiosa*, *Campanula*, *Orchidaceæ*, &c. Here, in May and June, by walking through the long grass, you cannot fail to disturb the local but unattractive *Acosmetia caliginosa*—a weak flyer, very easy to capture, and having very much the appearance of a *Crambus* when on the wing. *Hyria auroraria* occurs, but is very scarce, chiefly, I was told, frequenting the banks of the deep ditches which drain the inclosure in all directions, and where the herbage is most luxuriant. It is a very swift flyer, glittering like a little gold-encircled gem as it flashes past one in the sunlight. I only saw one alive, and that eluded all my endeavours to effect its capture. The best way is to follow this path along the edge of the inclosure (passing seven cross paths on the left and eight on the right) for about two miles, to its termination in a path through the centre of the wood. Here turn to the left, and keep straight on to the gate of the inclosure, opening out into another bit of rough ground; when you will see, facing you, the entrance-gate into the last inclosure to which I shall ask you to accompany me in this direction, viz. Stubby Copse. This is a wood not quite as old as Park Ground and Hurst Hill, but containing trees of very much larger growth than those in Park Hill. The undergrowth is exuberant and very varied, and small flowering plants (such as those already mentioned in describing the inclosure we have just left) are very abundant—I mention this because they are absent from many of the older inclosures. It is a large wood, and extends almost to the South Western Railway. The species taken here and in Park Hill are (with the exceptions already

mentioned and some others) common to both. I have elsewhere enumerated the greater number, but, besides all the British species of the genus *Argynnis* (except *Lathonia*), &c., *Nemeobius lucina*, *Thecla rubi*, *Euthemonia russula*, *Arctia fuliginosa*, *Nemoria viridata* and *Acidalia immutata* may be taken on the wing or disturbed from the herbage by day. *Erastria fuscula* may be dislodged from bramble, and *Aventia flexula* has also been beaten from the undergrowth. The four New Forest species of the genus *Zygæna*, *Plusia iota*, and *P. pulchrina* are to be captured buzzing at flowers—the first-named in great profusion. There is a gateway opening out of Park Hill Inclosure into Denny Wood, where I used to observe *Gonepteryx rhamni* lazily fluttering about the thistle-heads whenever I passed on a sunny day. I never witnessed such an assemblage of this gaily-coloured species elsewhere, though it was of more or less frequent occurrence all over the open forest, where it was much wilder on the wing and flew higher. The larvæ of *Dicranura furcula* and *Notodonta ziczac* may be found feeding on sallow.

Stubby Copse is surrounded for miles on all sides by wooded country; and all the district is well known to the Brockenhurst collectors, but personally I know nothing about the localities, except that they have been very productive. The largest are Denny Lodge Inclosure (including Woodfidley) to the eastward; Frame Heath Inclosure and Frame Wood to the south-east; New Copse Inclosure to the south, beyond the railway; and Pignal to the west. To the north of the latter lies Ramnor Inclosure, which can also be reached by following the rails of Park Hill to the right (instead of entering the inclosure) till you reach the first entrance lodge (after turning sharp to the right, where the two inclosures meet), where the hospitable keeper, Mr. Gulliver, is always ready to entertain visitors with a cheap glass of milk and an account of his latest captures. Here a path commences, which runs straight through to Pignal: there are some delightfully secluded nooks in this wood, purple with blue-bells in the spring, and which are said to be the best localities in the neighbourhood for the *Macroglossæ* and *Nemeobius lucina*, but I never found them commonly; indeed I know very little about the productions of this inclosure, which are said to have decreased in number since the undergrowth was cut down in 1871.

The extensive tract of forest commencing at the north-west corner of Park Hill Inclosure, and extending thence southward over an undulating tract of country, for about a mile and a quarter along the Brockenhurst Road, is known as Holland's Wood. On the opposite side of the way is another tract, extending from Foxleaze Park, opposite Park Ground Inclosure, to New Park (lately the well-known seat of Mr. W. Dickinson), and which lies opposite Ramnor. Both woods are of much the same character; but the undergrowth is, perhaps, more abundant and more varied in Holland's Wood, and it is of larger extent; indeed it is so comparatively trackless and dense that, without a companion, it is no joke to work it at night.

To return to Holland's Wood. Besides the "Crimsons," *Dicycla oo* occurred here in 1871; but the larvæ, having apparently been destroyed by the early frosts which in the two succeeding springs left the oaks quite blackened in May, it has only been seen singly since—at least up to 1875. The (at any rate till lately) extensive clumps of birch in this wood, and down the valley in Whitley Wood opposite, produce most of the usual birch-feeders, including *Notodonta dictæoides*, *N. dromedarius*, *Acronycta leporina*, and *Ennomos tiliaria*. I have seen more than one larva of *Stauropus fagi* and *Acronycta alni* taken in these woods; and, amongst oak feeders, *Ennomos erosaria* and *Cidaria psittacata* may be mentioned. In Holland's Wood there are some fine clumps of sallow, the most conspicuous being near a pool at the southern end of the wood. Somewhere near here *Dasycampa rubiginea* has been captured in the spring; and I am told that *Acidalia inornata* is to be taken. At the top of the slope, opposite the southern end of Park Ground Inclosure, there is a thick copse of sloe and hawthorn, which was the frequent resort of *Corycia taminata* and *Ligdia adustata* in May, 1875; and it was among the scattered trees just about here that I captured my first *Triphaena subsequa* at sugar, in August, 1871.

Cerigo cytherea, *Noctua neglecta*, *Catocala sponsa*, and *C. promissa* occur here, more or less abundantly, every season, and common species are a perfect pest. After 1871 I always found the Crimsons and *Cerigo cytherea* commoner outside than inside the inclosures. The sugared trees must be approached with great caution when the *Catocalas* are out. *C. promissa* requires an especially deft hand to effect its capture, as it sits on the sugar

with wings erect and vibrating ready for flight; while *C. sponsa* frequently allows them to drop roof-like over its body: both, when disturbed, fly upwards, careering round and round the tree with great velocity.

(To be continued.)

LIFE-HISTORIES OF SAWFLIES,

Translated from the Dutch of DR. S. C. SNELLEN VAN VOLLENHOVEN,

By J. W. MAY.

(Continued from vol. xi., p. 247.)

LYDA CLYPEATA, Klug.

Imago.—Klug, Die Blattwespen nach ihren Gattungen und Arten in Magazin der Gesellsch. nat. Freunde zu Berlin, ii. (1808) p. 279.

Larva.—Schrank, Fauna Boica, ii., 1, p. 255. Ratzeburg, Die Forstinsecten, iii., 83, Pl. I, f. 5. DeGeer, Mémoires (translation by Goetze), ii., 2, pp. 288 and 293; Pl. 40, figs. 15, 16, 24, 25, and 26. Frisch, Insecten in Deutschland, viii., 38, pl. xix.

Lyda nigra, abdomine maculis lateralibus 6 aut 8 pallide luteis, apice ferrugineo, pedibus ferrugineo-flavis; antennarum articulo quarto longissimo, alarum fascia transversa fusca.

Long. 11 mm. Exp. alarum 24 mm.

By some writers this insect is called *Lyda Pyri*, Schr., from the passage in the 'Fauna Boica', above indicated, where, however, Schrank only gives a very short notice respecting the appearance and food of the larva, which seems to me (following the authority of Ratzeburg) insufficient to give the right of priority to his name; for which purpose it is absolutely necessary that the diagnosis of the perfect insect should be sufficient to distinguish it from others of the same genus. For this reason I retain the name given by Klug in 1808. The genus *Lyda*, to which this species belongs, is, in this country, represented by but few species, which, moreover, are somewhat scarce: of the eight indigenous species with which I am acquainted I have only been able to observe the larvæ of two, namely, the present one and another species, the green larva of which occurs in Gelderland

on the leaves of the apricot, but the imago of which I have never taken. The larva of *Lyda clypeata* was first described by Frisch, who did not succeed in rearing the insect; next by Réaumur, who was equally unsuccessful, and subsequently by De Geer, who was more fortunate.

I found the larva near Heemstede, on pear trees, but I have no notes of the particulars. In the autumn of 1861, on the 2nd of October, my colleague Herklots brought me a number of larvæ which he had met with, also on a pear tree, at Warmond, where he was then living; fig. 1 is drawn from one of these. The larvæ of the genus *Lyda* are known to have no middle legs, and to live in a web in somewhat considerable numbers. The description of my larvæ, taken down at the time, is as follows:—The body is robust rather than slender, of an orange colour, in which at some times the red and at others the yellow tint predominates. The head (fig. 2) is shining black, and globular; the situation of the eyes is not so readily distinguishable as it is, for example, in the larva of *Cimbex*. The two long antennæ (fig. 3) to be seen at the sides of the forehead are composed of a number of joints, and are annulated with pale and dark brown; they are placed on an oval excrescence of a pale brown colour, which might be regarded as the first joint. The jaws are black; palpi and labium yellow, annulated with black.

The body is strongly wrinkled, being, however, nearly flat underneath; on the back the middle segments are divided into four larger folds. On the first segment, on either side of what might be described as the neck, is a triangular shining black spot, and just before the base of the anterior pair of legs is another similar spot, but much smaller. The openings of the stigmata were so narrow that I could not clearly make them out. The last segment of the body (fig. 5) is rounded at the end, and at the same time somewhat flat; it has on either side a little leg of a singular form, consisting apparently of two joints, of which the first is thin, cylindrical, and rather long, and the second pointed, with the basal half of an orange colour and the remainder shining black (fig. 6).

In addition to the absence of middle legs and the singular arrangement of the antennæ-like posterior legs, there is another circumstance by which these larvæ are distinguished from those of other *Tenthredinidæ*, namely, that the antennæ are placed

obliquely above the eyes, while in the others the eyes are above the antennæ. I do not find this mentioned by any author: I am, however, certain on this point, singular as it may appear; unless, indeed, I have failed to observe the eyes, and have taken for them little round wart-like excrescences.

Different writers have correctly described the habits of these larvæ, living together in a web, like the larvæ of *Hyponomeuta*. I have not made a drawing of the web spun by the larvæ on the pear, but I have figured the web from a hawthorn hedge, which I met with on the 6th of July at a country seat in Gelderland: this will be found represented at fig. 7. The larvæ inhabiting this web were somewhat differently coloured from those of the pear tree, but resembled them in general appearance. They were not of so deep an orange-colour, and had two paler longitudinal stripes along the dorsum; in addition, the anal legs were not black at the tips, as was the case with the former (*see* figs. 8 & 9); but as most German writers assert that the *Lyda* larva of the hawthorn is the same as that occurring on the pear, I have not hesitated to give a drawing of it in this place. I was not able to rear any of these larvæ, as they were all killed or washed away by a heavy rain the evening before I had intended to remove them to take them home with me. The larvæ from the pear tree, when full grown, spun a short case-like web from the pear branch to the earth contained in the glass in which they were kept; there was nothing remarkable in this, and it was, consequently, not half so pretty and interesting as that which DeGeer kept as a curiosity (*see* the description in Goetze's translation at page 294).

My larvæ also remained the whole winter in the ground, and when an imago made its appearance I turned over the earth in order to find a pupa: I found one which was, however, somewhat shrivelled; the remaining larvæ appeared to me to be dead. I was thus prevented from making a drawing of the pupa, but, after carefully examining my shrivelled pupa, I can endorse DeGeer's assertion that the antennæ, palpi, legs, and wings were separate and movable; only I cannot agree with the observation "*dass sie ohne die mindeste Bedeckung da legen,*" as in this instance these organs—as is the case with the other sawfly larvæ—were covered with a very thin and transparent skin.

The one imago which I obtained was a female (fig. 10), and

seemed to be so far imperfectly developed, as the neuration in either wing shewed a hiatus here and there. The left wing especially had more than one imperfection; for example, there were only two marginal cells instead of four, while in other places, also, parts of nervures were wanting. In figuring this imago I have restored the absent nervures, but in the third discoidal cell I have retained a redundant process of the lower nervure, which occurred in both wings.

The following is a description of this insect without the defects:—Length, eleven mm.; expansion of the wings, twenty-four mm.; head very broad and flat, dull black, rough, with two short longitudinal lines on the after part; between the antennæ are two yellow transverse lines; labrum black; the mandibles armed with two teeth, of which the outer is much longer and more pointed than the inner, the mandibles themselves being yellow with dark brown tips. The four palpi ferruginous. The antennæ, which are inserted between the eyes, are setiform, and have twenty-two joints, the last of which are very difficult to distinguish; the first joint is very small; the second, somewhat club-shaped, is a little bent outwards and of a yellow tint, shining, and having a fine black longitudinal line on the upper side; the third joint is short, reversed conical, and yellow; the fourth, as long as the preceding three, is narrow at the base, where it is of a yellow colour, becoming piceous farther on and a little thicker; the fifth is somewhat thinner, and is only a third of the length of the fourth; the fifth joint is black, as are all the following, which regularly decrease in length and thickness (fig. 11). The eyes are tolerably large and projecting, very nearly oval in outline, and of a dark brown colour; the three black ocelli are difficult to distinguish. The thorax is transversely depressed and rough on the dorsum, only the anterior lobes being smooth and shining, for the rest rough and dull. The tegulæ are dull yellow, the cenchri black. The wings are rather broad, very shining, transparent, and with brown nervures; the stigma is brown and thick, and from it descends a smoke-coloured band, which runs transversely across the anterior wing and on to the posterior wing, where it is of a fainter tint, and curves round the middle cell.

The abdomen is flat and broad; the first five segments are blue-black, the fourth and fifth having a pale yellow spot on either side; the following three are ferruginous with pale yellow

spots on the sides. On the ventral surface the first segment is entirely blue-black; the second is of the same colour, with a bilobed yellow transverse mark in the centre; the third is similar, but having, in addition, a little pale yellow spot on the side; the fourth is pale yellow in the middle and at the sides, brown and black between; the following segments are rose-coloured, the first of these having a black and pale yellow spot at the side.

The legs are orange-yellow, the two anterior pairs with the coxæ and lower half of the femora black, the posterior pair having only a shining black band on the femur. The anterior tibiæ are without spines, but the intermediate and posterior tibiæ have three past the middle, the first separate, and, farther on, the two others together.

A very fine female example, taken near Haarlem in June, 1866, by Mr. Ritsema, differs somewhat from the preceding. The two lines on the forehead between the insertion of the antennæ are replaced by a yellow triangular spot. The neuration of the wings is normal. The fifth segment of the abdomen is ferruginous above, with pale yellow triangular spots at the sides, and above, on either side, a blue-black mark. The under surface of the abdomen is represented at fig. 12. Lastly, the posterior femora have no continuous black band, but only a small black curved line beneath.

Klug states, *loc. cit.*, that he was not acquainted with the male of *Clypeata*; Hartig only mentions with respect to it that the abdomen is yellow, with the base black. Ratzeburg describes it somewhat more fully, and gives a figure of it. According to this author, it differs from the other sex in its whole aspect being yellow, the legs being entirely pale yellow, with the exception of the bases of the coxæ, and the abdomen, excepting the base, being brown-yellow. As I also never saw the male, I have copied Ratzeburg's figure on my plate 5.

The eggs I have never seen. Ratzeburg says that Dahlbom met with the imago in Sweden, and also found the eggs on the edges of the leaves of the hawthorn, but I do not know where the Berlin professor met with this statement: at all events, it is not to be found where one would most naturally look for it, namely, in the '*Clavis novi Hymenopterorum Systematis*,' page 38—*Lyda Hortorum* (?), where Dahlbom gives a very short description of *Clypeata*.

This species probably occurs throughout the whole of temperate Europe.

I think it well to add that F. Boie ('Stettiner Ent. Zeitung,' xvi. 50) distinguishes two very nearly allied species of *Lyda*, of which the one (*Clypeata*) has twenty-four joints in the antennæ, and the other (un-named), only twenty-two. According to this writer, the larva of the former species lives on the cherry—and pear (?),—that of the latter species on the hawthorn. It is difficult to form an opinion on this matter. If it were as Boie thinks, then the two larvæ which I have figured would belong to two different species; but it seems to me very probable that the antennæ as a consequence of more or less abundant food may be unstable as to the number of joints, just as some species of *Selandria* are unstable in the occurrence and the situation of the transverse nervures between the submarginal cells. The question whether we have to do with two different species must be left for further investigation.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DEIOPEIA PULCHELLA.—I have just examined a good specimen of *Deiopeia pulchella*, which my brother captured last August (1878) at Ventnor. He took it in a stubble field, in which clover had been grown in 1877.—W. C. DALE; Polegate, Sussex.

BOMBYX QUERCUS.—In the 'Entomologist' for 1878 (Entom. xi. 270) Mr. Laddiman, of Norwich, remarks upon the "great mortality amongst the larvæ" of *Bombyx quercus*. My experience, in Sussex, has been quite different. In 1875, and the three following years, I collected some dozens of these larvæ, of various ages, all of which produced imagos. I found the best cage to be an empty hat-box: the bottom of this was strewed with dry twigs of blackthorn, amongst which the cocoons were spun. I seldom got two females of the same tint; and last year (1878) I bred one nearly as dark as a male.—ID.

LEPIDOPTERA TAKEN NEAR YORK.—*Orgyia gônostigma*.—Whilst examining some birch trees on the 7th September, I noticed a larva of this species seated on a leaf. Some years ago I took two larvæ off sallow, but had not seen it again until last year; I therefore beat the trees, in the hope of finding more,

when, much to my surprise, sixteen larvæ turned up. They are now undergoing the process of hybernation. I hope to have the pleasure of rearing them to the perfect state. I am not aware of this species being recorded from York before. At the same time I beat out the long serrated cases of *Coleophora limosipennella*. *Amphydasis betularia*, var. *Doubledayaria*.—I bred twenty-six specimens of this variety last year. *Agrotis aquilina* and *Hadena suasa*.—These I took at sugar in September; also a curious variety of the latter, which has the orbicular stigma quite round, and the claviform stigma almost absent. *Dicranura bifida*.—I have pupæ of this species remaining over to the third year.—THOMAS WILSON; Holgate Road, York, March, 1879.

IDENTITY OF *CRYMODES EXULIS* AND *HADENA ASSIMILIS*.—In answer to the Rev. T. G. Smart's questions about *Crymodes exulis* in the March 'Entomologist' (Entom. xii. 84), the best authority probably on the subject is Dr. Staudinger, who, some years ago, was in Iceland, where the insect is abundant. He wrote exhaustively about it in the Stett. Ent. Zeitung in 1857 on his return. After taking and rearing about six hundred specimens his conviction is that *Assimilis*, as figured by Newman, and *Exulis*, and the many species of Guenée, viz., *Gelata*, Lef.; *Grœnlandica*, Dup.; *Gelida*, Gn.; *Poli*, Gn.; and *Borea*, H.-S.; are all one and the same insect. He expressly states, and has also repeated in his letters to me, that he found its variableness almost incredible. I do not know from what insects the drawings in Newman's work were made, but I am inclined to think that his names, as representing varieties, are inverted. My types of *Exulis* are of the size and shape of his *Assimilis*, light brownish grey ground colour, scales coarse and thick; as the varieties shade off to the opposite extreme of his *Exulis*, the size becomes smaller, the shape more that of *Adusta*, the scales finer, and the colour deepens to rich brown. *Hadenæ Zeta* and *Pernix* (Alps and Pyrenees), and *Maillardii* (Alps and Central Norway) approach closely to *Exulis*, but I have not seen them.—N. F. DOBREE; Beverley, East Yorkshire, March 14, 1879.

CHEIMATOBIA BRUMATA.—Having bred several females of *Cheimatobia brumata*, I find that the number of ova contained in each, averaged about two hundred and fifty, and that the larvæ

emerged in about two months.—G. C. BIGNELL; Stonehouse, Plymouth, March 14, 1879.

PLUSIA GAMMA IN MARCH.—On March 5th I saw, and could have captured, a specimen of *Plusia gamma* on a lamp by the road-side; and also on March 6th I saw a hybernated specimen of *Vanessa urticæ*. Does *P. gamma* hibernate?—C. HALE; Nassau School, Barnes, Surrey.

NYSSIA ZONARIA IN EPPING FOREST.—At the meeting of the Haggerston Entomological Society, held February 27th, Mr. E. Cooper exhibited two males and one female of *N. zonaria*, bred, from larvæ taken on one part of Epping Forest, 1878. Unfortunately he cannot give the exact spot, not knowing the larva at the time of capture; but states that of one of three localities in the Forest he is certain, not having collected any larvæ elsewhere. I have no doubt Mr. Cooper will try to follow up the discovery of this interesting species so near London.—J. BRYANT (Secretary); 10, Brownlow Street, Dalston, March 13, 1879.

BREPHOS PARTHENIAS.—On March 20th we saw this moth in great numbers in West Wickham Wood, but owing to the high wind were unable to take very many. Last season there was hardly a solitary specimen seen.—W. F. ROBINSON; 35, Collingham Place, S.W. J. L. SHADWELL; 4, Kent Gardens, Castle Hill, Ealing, March 21, 1879.

TAPINOSTOLA HELLMANNI.—One of your correspondents recorded last year Monks Wood as a new locality for this species: to the best of my belief this was, a year or two ago, its best-known habitat. When I first went to Cambridge, in 1872, Mr. T. Brown told me he was in the habit of taking it there, and described it as not very uncommon, flying at dusk among long grass or reed, adding that he knew of no other locality. Consequently, I was somewhat astonished to find it abundant at Wicken Fen, and, indeed, had some difficulty in persuading Mr. Brown of the identity of my captures with this species. Mr. F. Bond, with whom I corresponded on the subject, kindly informed me that he had also found the insect abundant at Wicken years ago, and had bred it from larvæ feeding in *Arundo phragmites*, a fact not generally known, I believe, among entomologists.—F. D. WHEELER; Chester Place, Norwich.

PERICALLIA SYRINGARIA.—Having noticed an article on this species as double-brooded, in the December number of the 'Entomologist,' I thought that my own experience with it this season might interest some. Having obtained a batch of eggs this spring, I sleeved them out on a privet hedge, and expected them to hybernate as larvæ; consequently I was a good deal surprised when, on examining the sleeve in July, I found it contained a good number of pupæ. I opened the bag and found that about one quarter of the larvæ were still small, while the greater part of the batch had pupated. The latter emerged in August, and their progeny are now hyberating together with the remains of the former brood, from which they scarcely differ in point of size. I never bred this species before, and had no idea that it was double-brooded, but on discovering this to be the case I examined the authors I had to refer to, and find that, of English works, 'Merrin's Calendar' gives as its time of emergence vi., vii., and s. viii., while Guenée says simply May and August, and Treitschke calls it distinctly double-brooded, the second brood being "less numerous, but more productive than the first," by which, I suppose, he was not aware that this brood is only a partial one.—F. D. WHEELER; Chester Place, Norwich.

CATOPTRIA ÆMULANA.—There are two forms of this insect under the above name, which I believe will prove to be distinct species. One form I have bred in some numbers from larvæ found feeding in the seed-heads of golden-rod, collected at the end of September; and in October, in woods in Kent and Surrey. The other form occurs on the salt-marshes at the mouth of the Thames, and has not yet, I believe, been reared from the larvæ; this I have never taken, having no opportunities of working its localities. The salt-marsh form is considerably larger than that reared from the golden-rod,—its markings are more distinct and silvery, and its colours brighter. Professor Zeller considers them identical; but my friend, Mr. C. G. Barrett, thinks these two forms may prove distinct species, but waits for proof. Its larvæ is likely to be found on some of the composite flowers (possibly *Aster tripolium*) growing at the mouths of rivers near the sea. Cannot some of the numerous readers of the 'Entomologist,' who are in the habit of visiting our favourite watering-places in the autumn, succeed in finding the larvæ and send a few to my friend for examination, and settle the question of their

identity or distinctness?—WILLIAM MACHIN; 22, Argyle Road, Carlton Square, February 17, 1879.

TELEPHORUS LIVIDUS var. DISPAR.—In one of the back volumes of the E. M. M., Mr. Rye, in recording his captures at Folkestone, says he found in abundance "the, to him hitherto rare, var. *dispar* of *Telephorus lividus*." I infer from this that it is somewhat restricted in its distribution. Round here the variety is almost as plentiful as the type, and I have commonly seen the male *T. dispar* in cop. with the female *T. lividus*. I do not remember ever seeing this order reversed. With regard to dark forms generally, I find them by no means uncommon. In my low-lying fields the black var. of *Pterostichus cupreus* is as abundant as the typical insect, but always smaller and more elongate. I have also *Lema cyanella* almost black, and one *L. melanopa* with the elytra entirely dull black. Last June I took about a dozen of *Strangalia nigra*, all of which had the legs entirely black. Of the two descriptions of this insect at my command, one does not mention the colour of the legs, but the other says "legs pale yellowish." I have never seen the latter form, but take a few with black legs every year.—THOMAS H. HART; Kingsnorth, Kent, February, 1879.

EGG OF CALYCOPHTHORA AVELLANÆ.—On the 5th of February of the present year a number of the *Phytoptus* bud-galls of the hazel were brought me containing the Acari, *Calycophthora avellanæ*, Am., in such enormous quantities that they clung together in masses, or were sprinkled over the inside of the diseased bud in as great numbers as dipterous larvæ may be found in some dead animal in warm weather. They were of various sizes, all apparently healthy and active, and in no way suffering from the severe winter; and amongst them were a few eggs almost on the point of hatching, but still retaining their characteristic shape. About the beginning of February, 1877, I had found similar eggs amongst the *Phytopti* of the witch-knot of the birch (figured Entom. x. 85; also see x. 280), but these were usually pressed out of all egg-shape by the *Phytoptus* within, and could scarcely be known as true eggs save by watching the escape through the broken pellicle. In the case of *Calycophthora avellanæ* this year the shape of the egg was still perfect or nearly so, of an obtuse oval, about one-fifth more in length than breadth, and not larger at one extremity than the other.

The pellicle, as far as I could make out, was simply a thin skin without any markings of its own, but of such extreme transparency and delicacy that the transverse striæ of the contained embryo might be seen perfectly clearly through it; and it also, sometimes, retained the markings of the striation of the tenant where there had been much pressure. The eggs varied slightly in appearance, as if at different stages; one oval, and filled throughout with striæ very clearly discernible; another, similar in shape, but in which the embryo lay curled within, showed the unmarked pellicle like the most transparent film in the unoccupied portions of the egg, which yet had some degree of power of resistance to pressure, for on a *Phytoptus* squeezing itself between the egg and another body close by, the contained embryo was in no way disturbed in position. There were also many pieces of broken pellicle, possible remains of hatched eggs. I have never before met with shoots of hazel with such great numbers of the swollen and distorted bud-gall, characteristic of this especial *Phytoptus* attack; and their formation, as well as the numbers and health of the contained *Acari*, did not appear to have been retarded by the severity of the weather.—E. A. ORMEROD; Dunster Lodge, Spring Grove, Isleworth, March 17, 1879.

EARLY APPEARANCE OF *SIREX GIGAS*.—On February 4th I had a fine male *Sirex gigas* given me, transfixed with a pin to a piece of wood, alive. Evidently, from its freshness and perfect condition, it had only just emerged. Is not this unusually early for this insect to make its appearance, especially considering the severe winter we have had? Last summer, no less than twelve *Sirices* were taken in an ironmonger's shop here.—JOSEPH ANDERSON, jun.; Chichester.

SIREX GIGAS, NEAR YORK.—Two specimens of this insect were captured at Holgate during the past season. Since then I have been splitting some boles of *Pinus austriaca*, when I discovered a number of larvæ of different ages of this species, some of them apparently full fed. Those full grown were about the size of full-grown *Sesia bembeciformis* larvæ.—T. WILSON; Holgate Road, York.

EASY METHOD OF SPACING CABINET-DRAWERS.—Being about to line out with fine thread the spaces in my cabinet-drawers for the series of insects to go into them, and conceiving that there would be a difficulty in tying all the knots at an equal distance from one another, the following plan suggested itself to me, and I have

found it answer very well, being both neat and expeditious, and requiring no great amount of skill or patience to make or use :— Procure a piece of white buckram, such as luggage labels are made of, and put a nice even coating of glue (not too thick) upon one side, taking care to keep the other side perfectly clean, then lay by till quite dry ; next get a small punch or a pair of eyeletting pincers such as those used by boot-makers, and punch out of the buckram twice the required number of gummed pieces, cut the silk or thread to the proper length or width of the drawers, then damp each end and press them upon the glued side of the labels, rubbing them down with the finger-nail : when dry, the line is complete. They can now be fixed in the drawer and pulled tight, by passing the point of a fine pin through the centre of the label with the forceps and pressing the line down flat to the surface of the drawer.—E. HOLTON ; 131, Holborn Hill, February 10, 1879.

[Our correspondent kindly forwarded examples of this method of spacing cabinet-drawers, which for neatness excels all other methods we have seen.—ED.]

ENTOMOLOGICAL PINS.—In view of the large number of valuable entomological specimens which are destroyed by the corrosion of the pins on which they are transfixed, I would wish to call attention to the great advantage that accrues by using black pins. A long time since Mr. E. G. Meek recommended to me some black pins, which, after considerable trouble, he had produced. I had some, and have used them ever since, and do not find the slightest trace of corrosion. Some of my friends, to whom I had recommended these pins, suggested that black pins must look unsightly ; and they were surprised to find that every insect of mine, which they had recently seen, was pinned with a black pin, and that they should have overlooked this fact. So far from their marring the appearance of the insects, I think these pins are particularly neat. They are made of the same sizes and strength as the ordinary gilt, or plain, entomological pins. In writing this, my only object is to bring under the notice of the readers the very valuable improvement Mr. Meek has introduced, and one which will be the means of preserving the more fragile moths, and those most liable to destruction, through corrosion of the metal caused by the chemical action set up by "grease." Mr. Meek may be congratulated upon his success.—A. B. FARR ; Dartford.

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HYMENOPTERA BRED FROM CYNIPS KOLLARI GALLS.

By EDWARD A. FITCH.

WE know of several isolated instances of illegitimate inhabitancy of galls by various orders of insects, which enter them at various stages of their existence, either to undergo their transformations or on account of the facilities offered for a secure and snug retreat from the snows and frosts of winter. This is not surprising; the young and succulent galls cannot be considered to offer an unsuitable pabulum for many phytophagous larvæ; the mature growth in many cases offers a substantial home to certain species, and when empty and in the decrepit state certain galls offer throughout the winter a most convenient hybernaculum to all insects, size only being the consideration; large numbers of small spiders and mites also avail themselves of these advantages. The large, round, woody, marble galls of the oak, commonly known as the Devonshire gall, is abundant everywhere. Last winter Mr. Walter P. Weston collected a quantity of these galls for the purpose of rearing *Ephippiphora obscurana*; he was not only successful in this, but secured from them a most interesting general collection. This included six species of Lepidoptera (Entom. xi. 239); seven Coleoptera, and thirty Hymenoptera: our note refers especially to the latter. The six Lepidoptera were all Tortrices, and have been sufficiently referred to. The Coleoptera were *Olibrus æneus*, Fab. (common); *Dasytes æratus*, Steph. (abundant); *Anaspis maculata*, Fourcr. (five or six); *Orchestes quercus*, L. (a few); *Cœliodes quercus*, Fab. (two specimens); *Coccinella bipunctata*, L., and *C. variabilis*, Ill. (a few specimens of each). These were probably all hibernating imagos, and call for no special remarks. Not so the Hymenoptera, which were as follows:—

Dineura (Nematus) Degeeri, Klug.—This common and variable sawfly is spoken of by Mr. P. Cameron as being only a birch feeder (Scot. Nat. ii. 113). The larvæ feed gregariously in the autumn; they spin their cocoons in October, but do not become pupæ till April or May. Mr. Weston bred one male and one female from the galls in which the larvæ doubtless spun up in the autumn.

Emphytus succinctus, Klug. (= *togata*, Panz.).—The larva of this fairly common sawfly is an oak, willow and birch feeder. Since the species is known to hibernate as a full-fed larva (Stett. Ent. Zeit. ix. 176) it is easy to account for its presence in the galls, where it found a convenient shelter in which to pupate. Mr. Weston assures me the specimens (two males and three females) were bred in the galls, as he observed them drying their wings.

Harpiphorus lepidus, Klug. (= ? *Fenusa Ianthæ*, Newm.).—One specimen only of this uncommon sawfly was bred. Dours says "La larve vit sous les feuilles mortes des chênes" (Catalogue, p. 17), and Mr. Cameron writes me that nothing further is definitively known of its life-history. Kaltenbach states that Kirchner has observed the larvæ of *Emphytus melanarius*, Klug., *E. togatus*, Klug., and *H. lepidus* in the interior (pith) of rose twigs; (Pflanzen-feinde, p. 222), but there is probably some confusion as to *Lepidus*.

Cynips Kollari, Hart.—The principal emergence of this insect—the true gall maker—takes place in the autumn, but somewhere about 20 per cent are not developed till the succeeding summer; consequently many specimens emerged from Mr. Weston's galls.

Synergus Reinhardi, Mayr.—A quantity of these cynipideous inquillines were bred. Four species are common in these galls, all of which winter in them; the specimens I examined were all *S. Reinhardi*, but it is probable that *S. melanopus* also occurred.

? *Cryptus* sp.—Six examples (four males and two females) of a remarkable and interesting Ichneumon were bred. Although a particularly well-marked species, it is difficult of determination, even generically. Mr. J. B. Bridgman, Dr. Capron, Dr. Kriechbaumer, and the late Mr. F. Smith all saw them, but without a satisfactory result as to their nomenclature.

Hemiteles areator, Panz.—Eight or nine females of this pretty but common little Ichneumon were bred. It has been recorded

from variable hosts; e.g., *Orgyia pudibunda*, *Lasiocampa pini*, *Psyche* sp., *Tortrix viridana*, and other Tortrices; *Yponomeuta padella*, *H. cognatella*, *Cerostoma costella*, *Gelechia albipalpella*, *Coleophora coracipennella*, *C. therinella*, *C. anatipennella*, and other Tineæ; *Hedobia imperialis*, *Anthrenus museorum*, and several other Coleoptera; *Lophyrus pini* and *L. variegatus* among the sawflies. In some instances this species, like others of its genus, has been proved to be hyperparasitic, and from the above list it is to be inferred that such is always the case. Its immediate victims are other Ichneumonidæ, probably of the genera *Cryptus*, *Phygadeuon*, or *Microgaster*. *H. areator*, has previously been bred from the galls of *C. Kollari* (Entom. ix. 53), and from the common oak apple of *Andricus terminalis* (Entom. ix. 35). Other species of *Hemiteles* have been bred from spiders' eggs, and one, *H. mandibulator*, Duf., is said to be a common parasite of *Crabro rubicola*.

Hemiteles spp.—Two others belonging to separate species were bred; although good specimens I have been unable to get them named. Dr. Kriechbaumer thus writes me about them: "Amongst the insects in my collection there is one species which Foerster identified as *Lochetica macrura*, most nearly related to these two females, but identical with neither: it has a complete areola."

Campoplex sp.—One specimen was bred. This is somewhat damaged, but it is, I believe a *Campoplex*. One species of this genus, *C. cerophagus*, Grav., is parasitic on *Emphytus melanarius*; this may have had a similar economy. According to Marshall's catalogue *C. cerophagus* is, however, a *Limneria*.

Limneria sp.—In Marshall's catalogue there are seventy-three British species included by him in the genus *Limneria*; hence it may be supposed that amongst such close allies it is difficult to identify a single specimen, which is all we have in the present case.

Mesoleius formosus, Gr.—This beautiful little Tryphon, of which one specimen only was bred, belongs to a large genus, the species of which are mostly known to be sawfly parasites. In this instance it is probable that *Dineura Degeeri* was the victim.

Exochus globulipes, Desv.—The genus *Exochus* is almost exclusively parasitic on Micro-Lepidoptera, though Kawall thinks that *E. coronatus*, Gr., and its variety *E. erythronatus*, Gr., may

probably be parasitic on *Cladius riminalis*; doubtless this Desvignian species appropriated one of the Tortricideous inhabitants. Two species were bred.

Ephialtes spp.—Several specimens of these fine Ichneumons were bred, and they are amongst the most interesting of the collection. There are certainly two new species and probably a third. I have carefully compared them with Ruthe's and Desvignes' collection in the British Museum, and with all the descriptions and figures I can find, especially Gravenhorst, Ratzeburg and Holmgren. I sent seven specimens (two males, five females) to Dr. Kriechbaumer, who quite agrees that there are two undescribed, and tells me they are quite distinct from any of the numerous species which are in the Munich Museum collection, and in his own. He especially mentions several small species bred from *Carpocapsa splendana* (from acorns), *Lipara lucens* (from reeds), and *Nematus vesicator* (from willow galls), with none of which they agree. Prof. Frey-Gessner and M. Lichtenstein have given some interesting accounts of bramble inhabitants in two recent numbers of 'Entomologische Nachrichten' (iii. 94 and 140). Numerous examples of *Ephialtes divinator*, Rossi. (= *Histrio*, Pz.) were bred early in May, which Lichtenstein says is parasitic on *Cemonus unicolor*, *Psen atratus* and *Trypoxylon figulus*, and, according to Dours' Catalogue, on *Cemonus rufiger* (teste Goureau). *E. mediator* is also parasitic on *Cemonus unicolor*, and it is probable that in these galls *Ephialtes* was similarly parasitic on some *Crabro*, as Mr. Weston particularly noticed the limp wings and ovipositor, which proved the specimens not to have been hybernators.

Clistopyga incitator, Fab.—Six males and one female of this rather variable Pimplid were bred. It is figured in 'Pinacographia,' Pl. xiii. fig. 8. Nothing certain is known as to the economy of the genus, but the few species are probably Lepidopterous parasites. Gravenhorst's *C. hæmorrhoidalis*, with which the female agrees, is given as a variety of *C. incitator* in Marshall's Catalogue.

Apanteles glomeratus, L.?—Three specimens, which are apparently identical with the very common *A. glomeratus*, were bred. This is uncertain, however, as doubtless these were hibernating imagoes, which I think is not the habit of the *Pieris*-feeder. There was another, but single, specimen which was abundantly distinct. This can at present only be characterised as *Apanteles* sp.

Eurytoma rosæ, Nees.—Two specimens belonging to this difficult genus of *Chalcididæ* were bred. Dr. Mayr has lately monographed it (Verh. z-b. Gesell. Wien. xxviii. 297—334), but still there is likely to be much confusion, especially to anyone following Walker's determination. Altogether, three very distinct species have been bred from *Kollari* galls. The common inhabitant of this and other oak, rose, &c. galls, is the variable *E. rosæ*, Nees (= *Abrotani*, Fonsc., = *squamea*, Wlk.); its size and time of appearance are altogether uncertain, but its black colour and structure is of course constant. *E. setigera*, another oak gall inhabitant, is distinguishable at once by the two long spines on the hind tibiæ, and *E. nodularis*, Boh. (= *rubicola*, Gir.) differs in many points. This latter species is a common parasite of various *Crabronidæ*, also of *Cryptus*; so that in *Kollari* galls it is possibly hyperparasitic on a lodger. Both Mr. Weston's specimens are *E. rosæ*.

Syntomaspis caudata, Nees.—Several specimens of this common oak-apple parasite were bred. When first I sent this Torymid to Mr. Walker as from *Kollari* galls, he altogether doubted it, it then being known only as a common parasite of *Andricus terminalis*; however, he afterwards bred it from these galls himself (Entom. ix. 53). Dr. Mayr only knew it from *A. terminalis* and *N. lenticularis* galls.

Callimome regius, Nees.—This very common but brilliant cynipideous parasite was of course bred in quantities. Being parasitic either on the gall maker or the inquiline, it varies greatly in size and somewhat in colour.

Megastigmus stigmaticans, Fabr. (= *giganteus*, Kollar).—This is one of the finest and prettiest of our British Chalcididæ, but varies considerably. Mr. Weston bred about a dozen examples (male and female). It is generally common, but in these galls only, in Britain. Mr. F. Walker bred 1103 specimens (682 males and 421 females) from one lot of *Kollari* galls in one year.

Lamprotatus sp.—Two beautiful specimens of a *Lamprotatus* were bred. This is probably a new species, but a large number of captured specimens have been described, which it is almost an impossibility to again recognise. Walker described forty-three British species in the 1st volume of the 'Entomological Magazine' under the generic name of *Miscogaster*, and quite as many more in 'Monographia Chalciditum,' 'Ann. Nat. Hist.,' 'Brit. Mus. List,'

'Ann. Soc. Ent. Fr.,' &c. I sent one of these specimens to Dr. Mayr, who tells me that in his large experience he never met with a *Lamprotatus* from these galls. Very little is known of their economy, but Van Vollenhoven records that Snellen bred *L. punctiger*, Nees, from a dipterous pupa, on May 15th, 1875. (Tijd. v. Ent. xix. 251.)

Pteromalus tibialis, Westw.—This common gall-parasite was bred abundantly.

Homalus (Hedychrum) auratus, L.—This pretty and widely distributed species is the commonest of our British Ruby-tails. It has only lately been known as an inhabitant of these galls (Entom. xii. 24). Mr. Weston bred nine specimens. Like all the *Chrysididæ*, it is parasitic on various *Aculeata*; in this instance the *Odynerus* was doubtless the victim, but it might have been *Prosopis*. This parasitism and inquilinism of the second degree is difficult to trace.

Homalus cæruleus, Degeer, Dahlb. (= *Elampus violaceus*, Wesm.) One specimen only of this species occurred. Mr. F. Smith tells us all his specimens were from bramble-sticks (Ent. Ann. 1862, p. 102); it is difficult to connect it with its host in this instance, but it was most probably *Prosopis*.

Rhopalum (Crabro) clavipes, L. (= *crassipes*, Fab.). Three males and one female of this *Crabro* were bred. It is not altogether uncommon for various *Crabronidæ* to take possession of these galls, though it has been but lately noticed in Britain. Dr. Mayr has bred *Trypoxylon figulus*, *Stigmus pendulus* and *Cemonus unicolor* from them. These alone, of course, engender a fresh and numerous army of parasites. *C. unicolor* is the species most generally met with in this situation, and Dr. Giraud has given a detailed account of its parasites in 'Verh. z-b., Gesell. Wien.' xiii., 1282. Dr. Rudow also writes "Die leeren Gallen beherbergen kleinere *Crabronen*, *Pemphredon* und junge *Meconema varium*, (Archiv Mecklenburg Vereins, 1875, 50)."

Passalæcus insignis, Van d. Lind. Several specimens of this generally common species were bred. Walker once bred a specimen of the closely allied *P. gracilis*, Curt., from these galls.

Odynerus trifasciatus, Oliv., Fab., Smith, nec St. Farg. (= *tricinctus*, Herr.-Schwef.) Two males of this rare solitary wasp were bred.

Prosopis rupestris, Smith.—Last but not least. Mr. Weston

was fortunate enough to breed two males and three females of this recently described and presumably rare bee. The numerous species of *Prosopis* are by no means particular where they construct their nests; any ready-made cavity seems to be appropriated. Mr. F. Smith instanced bramble-sticks, dock-stems, hole in a hollow flint, holes in the mortar of a wall, burrows and tunnels of various *Fossores* and *Osmiæ*, &c.; and Mr. J. Bridgman writes me, "*Prosopi* will make their nests anywhere. I have found them burrowing in soil like *Halicti*, in the old burrows of *Chelostoma campanularum*, in an old post, making use of the old cells of *Colletes Daviesana*, two of them in a cell partitioned off lengthwise in brambles and in old beetle-burrows." To these may now be added, abandoned galls. The genera *Prosopis* and *Sphecodes* were at one time considered to be parasitic, being destitute of the usual appendages adapted to convey pollen: but Mr. F. Smith has proved otherwise (see Entom. iii. 305, and 'British Bees,' p. 7). The female of *P. rupestris* is described in 'Ent. Ann.,' 1872, p. 103, and Mr. Smith was to have perfected his description by describing the previously unknown male. This MS. and specimens were in his hands, but, willing as we know the spirit of our veteran Hymenopterist was, the flesh was weak. The male is, however, rather smaller than the female, the body less ovate; the knee-joint of all legs whitish, the female having only the knee-joint of the hinder pair white; antennæ longer than in the female, and the face with two white side marks and a white clypeus, which latter is black in the female.

For years I have bred from these galls by the hundred, and never met with any species of *Aculeata*, *Tenthredinidæ*, or *Ichneumonidæ*. Mr. Weston's experience requires explanation: in collecting his stores he gathered them in winter, and mostly those galls from which the normal inhabitants had escaped; I always collected earlier, and especially rejected the empty galls, my purpose being the Cynipids and Chalcids. We now see what a harvest may be reaped from the abandoned or pierced galls. Should others be led to follow this line of collecting, I would ask them to remember that all the species bred have a certain value, whether they belong to a favourite order or otherwise. In the small circle of a gall several life-history facts may be established conclusively, although many of the above-mentioned insects were only hibernators in convenient winter-quarters.

A LEPIDOPTERIST'S GUIDE TO LYNDBURST.

By BERNARD LOCKYER.

(Concluded from p. 101.)

If you follow a path (commencing just before the sloe bushes) down the slope leading through the Birch Copse overlooking a heath at the bottom of the valley, you will, after rather more than half a mile's walk, reach the gate of Hurst Hill Inclosure, about which I have said all I need say already, except that the larva of *Boarmia consortaria* was perhaps of more frequent occurrence here than elsewhere in August, 1874, and that *Xylina rhizolita* comes freely to sugar. All the open forest outside the gate is good sugaring ground. Follow the path through this inclosure to the opposite gate, when you will find yourself in another tract of beech-shaded forest, watered by two streams of some width, which flow into Lymington water. This is "Queen Bower," rendered additionally lively on a summer's day by the presence of numerous fluttering *Libellulidæ* of perfectly tropical brilliancy. At Queen Bower is the junction of the two streams. Follow their united course to the east as far as the first bridge, where cross the stream and keep to the right over the extensive expanse of rough country called Ober Heath (following the course of the stream), till you arrive at the gate of a small inclosure of the same description as Pondhead, &c., having a young fir plantation on the right-hand side. This is Fletcher's Copse, where, alongside of a stream, are some five salallows from which I beat the only larva of *Gonoptera libatrix* that ever fell across my path; but where, strange to say, the oaks were almost entirely destitute of larvæ. On the further side of this copse you will find a narrow lane, and directly in front you will see the rather imposing entrance to Rhinefield Sandys—a broad avenue of stately oaks of a much larger growth than those surrounding them. When I first lighted on this inclosure, on 16th August, 1874, it was apparently a *terra incognita* to collectors, for there were no signs of sugaring, and, as I have already stated, larvæ were more abundant than in any other inclosure I had worked. It was here that I took the only larva of *Stauropus fagi* that ever came into my possession. A winding path, about a mile and three-quarters long, brings you out on the main Christchurch road opposite

the large tract of woodland known as Burley Inclosures. Vinney Ridge, a large new inclosure containing a heronry, lies to the right. It is stated that *Pieris erategi* is common about here, but I never had an opportunity of verifying the truth of the statement. The only drawback to Rhinefield is the almost entire absence of undergrowth, there being scarcely any bushes and only a few wretched apologies for clumps of bramble, which appear—why I know not—to be quite parched up and only just able to rear their drooping heads above the soil. Just outside the entrance into the inclosure from the Christchurch road are, or were, a few very fine old oak trees, on one of which I took a small colony of the larvæ of *Cidaria psittacata* (which I had found rare elsewhere); they were very vividly coloured, and elongate even for *Cidariæ*. I will not trouble the reader to follow me to the other inclosures along the Christchurch and Ringwood roads. They are very large, and no doubt would be productive in a good season, as the undergrowth (which includes in some of them a good deal of maple) is denser and more varied than in many of those I have described. The beauties of the fine beech glades in this direction, and of Knight Wood and Mark Ash, have been held up to the admiration of tourists time out of mind; and between them and the Christchurch road lies such an extended expanse of woodland (*e. g.* Anderwood, Oakley and Burley old and new inclosures, &c.), covering more than four square miles of country, that it would be strange indeed if they were entirely void of insect inhabitants. One of them, noted for its fine holly and rhododendrons, is said to be a favourite resort of the *Macroglossæ* and *Lycæna Argiolus*; but their distance from my head-quarters prevented my caring to risk wasting time by neglecting the localities with which I was already acquainted in their favour, and I never met with any one who knew much about them. In one (Dames Slough Inclosure) I once took a solitary *Lycæna Corydon*, flying amongst long grass on a very cloudy day. This is a plantation of even smaller trees than those in Park Hill. The only other locality hereabouts that I shall mention is Gritnam Wood, a good-sized glade, composed principally of fine beech trees and occupying the rising ground to the north of Hurst Hill, between it and the Christchurch road. Here the larvæ of *Ephyra trilinearia* swarmed in 1874, and *Platypteryx unguicula* and *Lithosia rubricollis* are said to

be common. *Demas coryli* also occurs. With respect to Minstead, which can be reached either by following the road to Cadnam to the first turning on the left (Pike's Hill), and turning off to the left again, through a plantation of oaks and firs, into Manor Park, where a bye path takes you out on to the high road after about a mile's walk, or by keeping to the high road as far as the first mile-stone, where a road branches off to the left, which, after passing two turnings on the left, brings you to the entrance lodge to Manor Park, and, after about a third of a mile more, to Minstead itself. Follow this road past one more on the left, and one on the right, till you come to a path to the right leading to a beech glade, with the enclosed ground belonging to Castle Malwood at the upper end on the left, and a row of cottages on the right: behind these lies Shave Green Inclosure, which I found most profitable for day work in August, 1871. Though late in the season, most of the butterflies for which the forest is famed were common, but of course worn. Here I captured a remarkable specimen of *Argynnis Paphia*, in which the silver of the under side was replaced by pale iridescent pink and golden brown.

Cosmia affinis was commoner among some elms, near the cottage where I was staying, than I found it in other parts of the forest. *Boarmia cinctaria* is not rare among young fir trees on a heath somewhere on the Christchurch road; but the exact locality is a secret only known to one or two resident collectors, who, for the best of reasons, keep it a profound one. The only locality for *Eulepia cribrum*, with which I am acquainted, is on the road to Wimborne, in Dorsetshire, some miles west of Ringwood, the extreme westerly boundary of the forest; along with it I saw *Lithosia complana* beaten from small fir trees, and *Acidalia straminata* disturbed from among the heather. The locality is only a limited one, but the insect is a swift flyer and often leads one a long dance over the rough ground.

In conclusion, for the information of those who may prefer to procure lodgings at an hotel previous to starting for the forest, I may mention that the two best inns at Lyndhurst are "The Crown Hotel" and "The Stag." The latter used to be very comfortable in the days of its late unfortunate proprietor, and the prices were then moderate; but of its present occupier I know nothing. I omitted to mention that *Cidaria dotata* and

Noctua Dahlii have occurred on the wing, *Lobophora sexalata* on palings, *Xylina semibrunnea* and *X. petrificata* at ivy bloom are met with in and near the village.

27, King Street, Covent Garden, W.C., 1879.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. XIII. NYMPHALIDÆ.—NYMPHALINÆ.

(Species allied to CATAGRAMMA.)

Catagramma and its allies form one of the most characteristic and beautiful groups of Tropical American butterflies; and to this district all the genera are exclusively confined. They are not large insects, but are remarkable for their brilliant colours and markings, and generally frequent damp places in the forests, where they frequently settle on the wet ground.

The genus *Callicore* includes a number of closely-allied species, all of a rich dark-brown or velvety black above. The fore wings are crossed by a bar of changeable bluish green, blue, or purple, which runs obliquely from the middle of the costa to the inner margin before the hinder angle. The bar varies much in breadth, and the wing is frequently more or less suffused with purple towards the base. Towards the tip there is often a small white or blue spot. The hind wings are sometimes spotless, but are generally marked with a metallic-green or blue submarginal stripe; and are sometimes more or less suffused with the same colour within it. The under surface of the fore wings is of a rich scarlet towards the base, followed by a curved black band, varying in breadth; and the tip is silvery white or buff, intersected by a black line. The hind wings are silvery white or buff, with two oval black rings in the centre, each of which contains two black spots, varying in size, and sometimes connected. These are enclosed by two large black rings, which run round the whole wing, except on the costa, where the circle is not complete.

The genus *Perisama* much resembles *Callicore* in shape, the fore wings being triangular, and the hind wings rather more oval, and generally but slightly denticulated. The largest species

expand about two inches, but most species are rather smaller. On the upper side this genus resembles *Callicore*, but the band of the fore wings is frequently incomplete, and, when this is the case it is combined with more distinct basal stripes. The fore wings are black beneath, with the tip pale, and intersected by a black line; and the basal portion is frequently more or less broadly red or yellow. The black portion of the wing is nearly always more or less spotted with blue, which is never the case in *Callicore*. The under side of the hind wings is yellow, silvery white, or buff, and is nearly always crossed by two black lines running from the costa, and frequently diverging, but approaching each other again towards the anal angle. Between these runs a row of black dots, occasionally wanting, and sometimes accompanied by some slight whitish markings. In one species (*P. Bonplandii*) the whole under surface of the hind wings is uniform silvery white.

The genus *Catagramma* varies in size from one and a half to two and a half inches. It much resembles the last two genera in shape and appearance, but the eyes are naked instead of hairy. The species are of a deep black, adorned with rich shades of crimson or orange on the upper side, and frequently glossed with purple over the black, and in some cases over the crimson. In some species the sexes differ little; in others the males are crimson, and the females orange; or even, occasionally, black above. But the sexes differ much in their habits; the females generally lead a retired life in the forests, and are often very rare, even when the males are abundant. In one group of the genus the fore wings are marked above with a broad transverse orange bar, and the hind wings with a large metallic-blue blotch towards the anal angle. The fore wings beneath are black, with the orange band extending over the centre and more or less of the base of the wing, and towards the tip is a paler yellow line, followed by a pale blue line before the fringes. The hind wings are marked with alternate stripes of black or yellow, and with pale blue spots towards the anal angle; sometimes the centre of the wing is more or less broadly black, with an irregular row of blue spots; or yellow, enclosed by a black ring, and with black spots with one or two blue pupils upon it. The crimson species vary much in pattern above. Sometimes the crimson is confined to the fore wings, and may consist of a single stripe; or the

basal half may be rosy ; and there is frequently a white or orange mark near the tip. In other species the red covers more or less of the hind wings, and the fore wings are crimson at the base and crossed by a broad transverse crimson bar beyond the middle. The under side of the fore wings resembles the upper, but is paler, and the apical markings resemble those of the first section. The under side of the hind wings varies ; sometimes the centre is dull yellow, enclosing two large black spots, each marked with a variable number of eyes. This is enclosed by a black ring (incomplete on the costa), which is double towards the base and single towards the hind margin, where it is marked with a row of blue spots. Sometimes the black spaces on which the blue spots are placed are so extended as to occupy the greater part of the wing ; at other times the yellow ground is slightly suffused with red, and so extended as to fill the whole centre of the wing, being marked with two black eyes with blue pupils. There are a great number of species, but all with a strong family likeness.

The little genus *Hæmatera* is also black or brown above, with more or less extended red markings. The species expand from one and a quarter to one and a half inch, and may be known from the allied genera by the brown under side of the hind wings, which is slightly varied with rusty, and indistinctly marked, as in some *Satyrinæ*.

Callithea, the most splendid genus of the *Catagramma* group, contains larger species, varying from two to nearly three inches in expanse, and chiefly found towards the west of South America ; the larvæ are spiny. In *C. Sapphira*, one of the handsomest of the genus, the male is of the richest blue, while the female is blue only at the base, followed by a broad transverse orange band on the fore wings, while the hind wings are bordered with dull green. The under side of the hind wings is dull green, with several transverse rows of black spots. Some of the other species are similarly marked, while others are bluish black towards the base, and with a pale bluish band round all the wings, almost like that of an *Elymnias*. The under side of all the species is green, frequently more or less orange at the base, and marked with transverse rows of black spots, some of which occasionally coalesce into lines.

ENTOMOLOGICAL RAMBLES, 1878.

By J. B. HODGKINSON.

I AM afraid, in relating my experiences of the unentomological season of 1878, I shall have to chime in with many others of your correspondents as to the paucity of insects; still it was not quite a blank to me. Perhaps this may be accounted for, to some extent, by my varying the districts in which I collected, thinking surely every place could not be alike. I was driven to this seeking for a change of scenery, for my old favourite prolific fields had become monotonous through the almost total absence of insect life. To begin with March, or couple the month of April with it, I found the birches to yield very few *Micropteryx* or *Incurvarie*; *I. Zinckenella* was scarcer than usual, though I tried both Windermere and Witherslack. The hybernating species were almost unrepresented; a few *Peronea lipsiana* got up during the odd gleams of sunshine, leaving nothing to fill up my time with but looking for *Elachista* larvæ in the grass stems, both a cold and wearisome job. As a change, one got a little relief by looking for the larvæ of *Lampronia prælatella* again, just to fill up time more than actually wanting them. One remarkable thing struck me, and that was you might see a piece scooped out of the strawberry leaves the size of one's finger nail, quite fresh, still the cases that covered the larvæ were all brown and withered. The larva is not at all peculiar to the wild strawberry, for there was a large umbelliferous leaf it used quite as readily.

May comes in, and one naturally hopes for more specimens, especially among the genera *Lithocolletis* and *Nepticula*; but here comes the same sad story—there was one moth where formerly fifty occurred, a few *Nepticula sorbiella*, and among mountain ash and on the heath were pretty commonly *Cnephasia lepidana*, and among young birches *Nepticula lapponicaella* was pretty frequent. This new species I had named as *N. reversella* in my cabinet. It had previously been named *Luteella* for me; but when Mr. Sang sent on his *Luteella*, I at once saw they were quite distinct from my Witherslack specimens. From the 20th of May to the end of the month I made three journeys to get some *Nemoria viridata*; all that I saw were five specimens, though I used to take a hundred in a day. Seeing there were so few

moths I turned to larva hunting, and I met with some luck. I beat a sloe hedge for *Ephippiphora signatana*, where I ought to have had some dozens; nothing but beetles, bugs, and *Aphides*, with a solitary brimstone moth caterpillar, were to be found in my umbrella. With so many disheartening journeys, I felt glad to have a look round my breeding-room, and here I found *Nepticula æneofasciella*, hitherto a rare species, out in plenty—in fact, I set about 150. The same with *Ornix Scoticella*; this species was rather a disappointment to me, for I have tried in vain to breed from *Pyrus aria* what I thought would be a new *Lithocolletis*, so I went in heavily, making efforts to get a number to be certain. I found a tree of *Pyrus torminalis* as well, with four or five larvæ on a leaf; the result was *Scoticella* by hundreds. *Botys terrealis*, *Eupithecia virgaureata*, *Lithocolletis cavella*, *L. torminella*, *L. lantanella*, &c., kept coming out. I was most surprised to find a worn-looking specimen of *Cidaria reticulata* out with three wings. In fact, 1878 might be called a “three-winged” season, for there were many such in my breeding-cages. Quite a number of *Eupithecia denotata*, *E. subumbrata*, *Botys terrealis*, &c. Nothing pleased me so much as to see the result of my puzzle, viz., the larvæ in the stems of the balsam (*Impatiens noli-me-tangere*), when I was gladdened with the sight of the beautiful new Tortrix, *Penthina postrema* appearing. I bred eleven specimens, both sexes being among them. I made a journey to the spot where I got the larvæ, to see if any moths would turn up, but only got one poor specimen, and that was all I got for a journey of over one hundred miles.

Now June comes round, and I think it time to try fresh ground, and make my way to Arnside. On some high lands opposite to Grange-over-Sands, I find *Thera simulata* larvæ, and plenty of *Eupithecia sobrinata*. My main object was to see what could be turned up in this district among the *Rosa spinosissima*. About the middle of the month I collected a lot of twisted leaves, expecting to find the beautiful *Spilonota incarnatana* (*amænana*), and possibly *Peronea permutana*; the latter I failed in, but from the leaves gathered I bred the rare *Incurvaria canariella*, *Peronea variegana* (all forms), *Spilonota roborana*, *S. incarnatana*, *Padisca semifuscana* (some strange forms), and, oddly enough, *Gelechia expositella*; these may have crept up from the grass beneath, but I noted at the time *Gelechia* larvæ. There were

plenty of *Coleophora gryphipennella* blotching the leaves. The pretty little *Cidaria fulvata* larva was feeding upon the same plant.

I crossed over to Grange, and found a colony of *Depressaria pimpinella* larva, from which I bred about thirty, and a few *D. capreolella*. One thing I especially noticed was that I could find no larva of *Nepticula aneofasciella* among the agrimony. The larvæ from the first brood ought to have shown in plenty, but they were absent; whereas in October they were in profusion on the same plants. Query, had the eggs lain over from some cause? Altogether the season was a strange one; flowers in profusion, but such a remarkable absence of insect life. Sometimes in former years I could not sweep without getting a net full, while in 1878 I swept several nets away to no purpose.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DESCRIPTION OF THE LARVA OF EMMELESIA ALCHEMILLATA.—

The larvæ from which the following description was taken were sent to me at the end of September, 1877, by Mr. J. B. Hodgkinson, of Preston. He had found them feeding on the seeds of the common dead-nettle. Length nearly half an inch, and tolerably plump in proportion; head highly polished, it has the lobes rounded, is a trifle narrower than the second, but wider than the third segment; immediately behind it, on the second segment, is an equally polished half-circular plate, and there is also a similarly polished plate on the anal segment. Body cylindrical, of tolerably uniform width, tapering a little posteriorly; segments plump, the divisions well defined; there are a few scattered short hairs. Ground colour of the dorsal surface, a rather pale but warm purple; the head, and frontal and anal plates, intensely black. A broad pale yellow stripe extends throughout the dorsal area, dividing the black frontal plate into two sections; there is also a similarly coloured but much narrower line along the subdorsal region, and another one between this and the spiracles. Spiracles and tubercles minute, black; the hairs gray. Ventral surface uniformly pale yellowish green, with a few minute black tubercles.—GEO. T. PORRITT; Highroyd House, Huddersfield, April, 3, 1879.

TRYPHON SCABRICULUS, *Grav.*—Gravenhorst placed the male of this Ichneumon amongst the *Tryphonidæ*; Mr. Marshall in his list removed it to the *Pimplidæ*, as a doubtful species of *Phytodietus*; Dr. Vollenhoven in the last part of 'Pinacographia' (No. 7) figures the female under the generic name of *Ædemopsis*, Tschek., and says that it belongs to the *Tryphonidæ* and ought to come after *Eclytus*. I cannot help thinking that Marshall and Tschek are right, and that it ought to remain amongst the *Pimplidæ*, and in Holmgren's Sect. ii., A. a. +; I think the length of the aculeus prevents it being a *Tryphon*; but the object of my communication was not the discussion of its place in the list, but to call attention to what are either other species of this genus or varieties of a very variable species. I shall not minutely describe the insects, because Gravenhorst has already described the male (I. E. ii., 180), and there is a very good general figure of the female in Vollenhoven's plate 32, fig. 1, but only point out the differences of each variety. No. 1 (female).—Antennæ, fourteenth to eighteenth right hand joints white, the base of fourteenth and apex of eighteenth dark; fifteenth to eighteenth left hand are entirely white; the 1st segment of abdomen has no tubercles, gradually widens from base to apex, this latter twice as wide as the base; the 2nd segment about one and a half times longer than broad. This appears to be the variety figured by Vollenhoven; I have taken but one specimen. No. 2 (female).—I can detect no difference, but that the antennæ have no white ring. I have three specimens of this variety, and they vary slightly in the width of the apex of the 1st segment of the abdomen. No. 3 (female).—Antennæ, seventeenth and eighteenth joints white; 1st segment of abdomen with very projecting tubercles in about the middle of the segment; petiole gradually tapering to the tubercles: here it is about twice as wide as the base of the petiole; the post petiole a trifle longer than broad and only very slightly tapering; the 2nd segment has a node on each side rather in front of the basal third, the segment only very slightly longer than broad, almost quadrate. I have but one specimen of this variety: it is about 1 mm. longer than the two previous; they are 6—7 mm., and this is 8 mm. in length. No. 4 (male).—The first segment almost tapering and without tubercles; not quite twice as broad at the base as the apex; the 2nd segment nearly twice as long as broad; length 6.5 mm.

No. 3 (male).—The 1st segment of abdomen with projecting spiracles, but not quite so wide in the middle as No. 3; the second segment a little longer than broad; the apex of the 1st segment wider than No. 4; this (No. 5) and No. 3 more coarsely punctured, especially on the 1st segment. I cannot help thinking that No. 3 and No. 5 are male and female of one species (the male agrees with Gravenhorst's description); No. 1 and No. 2 may be only varieties of the original species; the colouring of all is very much alike, and so is the puncturing; the depressions between the lobes of the mesothorax are somewhat consute; the metathorax is coarsely rugose and has five areas, which are rather indistinct by reason of the roughness; the metathoracic spiracles are small and round.—JOHN B. BRIDGMAN; Norwich.

CATOPTRIA ÆMULANA.—Apropos of Mr. Machin's remarks about *Catoptria æmulana*, which appeared in the 'Entomologist' of last month (p. 109), while this day looking over a typical collection of European Tortrices made by the late Mr. Henry Doubleday, I noticed five specimens of the supposed variety of *C. æmulana*, which Mr. Machin and I have bred from blossoms of the golden rod (*Solidago virgaurea*). They were labelled, in Mr. Doubleday's own handwriting, *Catoptria decolorana*. These specimens were identical with our golden-rod friend.—E. G. MEEK; 56, Brompton Road, S.W., April, 1879.

[On referring to Dr. Wocke's list of the Micro-Lepidoptera of Europe, we find *C. decolorana* occurs in Germany and in Russia. We hope that during the coming season specimens of both forms may be reared and the larvæ described.—ED.]

BRILLIANCY OF FLOWER-HAUNTING INSECTS.—Mr. Grant Allen, in his interesting work 'The Colour Sense,' propounds the theory that there is a marked connection between the colour of animals—especially insects—and those of their food, brilliant species being in a majority of cases such as haunt flowers or feed upon fruits. Many of the instances he brings forward certainly support his position, but the exceptions seem too many and too formidable to be overlooked. Thus the *Chrysididæ*, probably the most beautiful family among the Hymenoptera, are rarely found amongst flowers. Our common *Chrysis ignita*, as Professor Westwood correctly remarks, haunts "walls, palings, and sand

banks." The *Scutelleridæ* (Hemipterous) feed upon the juices of leaves, as well as upon caterpillars, which they pierce with their sucking-tubes. Yet many of them vie in beauty with the most splendid Coleoptera. Mr. Allen adduces the *Cetoniadæ* and *Buprestidæ* in proof of his theory; yet in both these splendid families there are not merely numerous individuals, but even groups as dull and sombre as the generality of carnivorous or carrion-feeding beetles. *Oxythrace stictica*, *Aleorostictus variabilis* and *Valgus hemipterus* are totally devoid of gay coloration. The *Telephori* frequent flowers in search of *Aphides*, &c., yet their coloration is very plain and insignificant. Among Lepidoptera also, the *Sesiidæ*, though perfectly diurnal and flower-haunting, make little display of colour. Nor can all the true butterflies boast of great beauty, as witness certain species of *Hipparchia* and *Erebia*, which yet feed upon the nectar of flowers. Finally, I may mention the gay hues displayed by certain Orthoptera which are by no means in the habit of frequenting, or feeding upon, flowers. Hence I submit that, as far as insects are concerned, Mr. Allen's views, though decidedly suggestive, can scarcely be definitely accepted.—C. R. SLATER; Bicester Road, Aylesbury.

GALL ON THE GREAT KNAPWEED.—At vol. x., p. 124, of the 'Entomologist' I described and figured a gall on the pinnatifid leaf of the great knapweed (*Centaurea scabiosa*) as that of *Diastrophus* (*Isocolus*) *scabiosæ*, Gir. I lately sent the imago, bred from this gall, to Dr. Mayr, who returns it as certainly a new species between *D. scabiosæ* and *D. areolatus*. The true *D. scabiosæ* makes a multilocular gall on the knapweed stalk; the gall of this new species is unilocular, and occurs on the leaf-stalk or midrib. My single specimen came from Topley Pike, near Buxton, and I now call attention to it in the hope that it may be recognised if again met with. I should be thankful for fresh specimens.—EDWARD A. FITCH; Maldon, Essex.

BLACK ENTOMOLOGICAL PINS.—We can fully endorse Mr. Farn's remarks on the use of black entomological pins, never having met with an instance in which a specimen pinned by one of these enamelled pins has been destroyed by verdigris. Another great advantage is that the wings are less liable to "spring" than when the ordinary pins are used. The black colour and very small heads make these pins scarcely noticeable in the collection. We would

suggest, as most suitable, No. 20 for small *Tineæ*; Nos. 18 and 10 for large *Tineæ* and *Tortrices*; Nos. 10 and 15 for *Geometers*; and Nos. 8 and 5 for the *Noctuæ*.—ED.

REVIEWS.

The Transactions of the Entomological Society of London, for the year 1878.

JUDGED by quantity or bulk the volume for 1878 must yield to its predecessors, as it contains but 335+88 pages and six plates against 439+93 pages and ten plates in the volume for 1877, 655+87 and twelve plates for 1876, 342+68 and nine plates for 1875, and 548+70 and eleven plates for 1874. Judged by the more severe test of quality it can hardly be said to equal, certainly not altogether to surpass, any of the last few volumes. In the Transactions of a society like the Entomological it is quite idle to expect them to maintain a given standard of excellence; as here, so in other cases, certain important and interesting memoirs come spontaneously and irregularly, not in answer to any given call or need.

There is still much to learn from the volume for 1878, and to that we more particularly limit ourselves, the present article being intended more as a digest than for a review. Thirty-one memoirs, from nineteen contributors, are printed—a larger number than has appeared in any volume since the first of the 3rd series (1862-4); twenty-one of these relate to descriptions and lists of exotic species. Classification is the subject of one; habits and economy, five. There is one on structural peculiarities—the hairs of bees—which may be useful in throwing light both on economy and classification; two concerning the colour and forms of larvæ, which come somewhat indirectly within the now wide range of Darwinism, and one on practical Entomology. This last is a short paper by Miss E. A. Ormerod, on "The Prevention of Insect Injury by the use of Phenol Preparations." A detailed account of how the use of the preparation checked an attack from the "rust" fly (*Pila roseæ*) in the carrot, is given. The two papers bearing on the great natural selection theory tend altogether to bear out the views of Wallace, Darwin, Weismann, and others, viz., that, as a general rule, edible caterpillars are dull or

protectively coloured, whilst inedible ones are often brightly and conspicuously coloured. In support of these views Sir John Lubbock has examined the Macro-Lepidoptera, and Mr. P. Cameron the Tenthredinidæ, showing that both the sawfly and lepidopterous larvæ have great similarity in their variation. Mr. E. Saunders' short observations on the hairs of British aculeate Hymenoptera are altogether original, and their importance will probably be recognised at some future period.

Of the twenty-one descriptive papers, twelve belong to the Coleoptera, two each to the Hymenoptera, Hemiptera, and Neuroptera; and one each to the Lepidoptera, Arachnida, and Myriopoda; but none call for any special notice here. The single memoir on classification is one in which Mr. A. G. Butler has attempted to show that the natural location of the *Ægeriuidæ* ("clear-wing" Lepidoptera) is between the *Pyrales* and the *Gelechiidæ*; this is novel, but the arguments are well worked out and fully illustrated with a plate, so that no doubt they will receive the attention from systematists which they appear to deserve. We now come to five memoirs of more general interest, those relating to habits and economy. Last year we had occasion to notice one of Mr. Mansel Weale's papers on South African insects, which had almost exclusive reference to the Lepidoptera; this year "protective resemblance" seems to be still the key-note, and many instances of undoubted mimicry are faithfully recorded. Dr. Fritz Müller strikes a similar chord from Brazil, but more especially enlarges on the "odours emitted by" and "sound made by" various Lepidoptera. Professor Wood-Mason contributes four short notes on the structure and habits of various *Mantidæ*, and Mr. Dunning gives a digest of Ritsema's recently published paper on the life-history of *Acentropus* (Tijd. v. Ent. 1878). This is a favourite theme of Mr. Dunning's, and he has the satisfaction of seeing several of his conclusions independently confirmed. Sir Sidney S. Saunders has contributed a memoir on those very remarkable and somewhat abnormal Hymenoptera which inhabit various figs and assist in their caprification. Even considered apart from their life-history they are most interesting, but altogether we greatly wish for more information from M. Lichtenstein (who supplied Sir S. Saunders with his material) or some other competent source. Newman published a note in the 'Entomologist' on similar insects, founded on Walker's digest

of Dr. Coquerel's observations (Entom. v. 399); and there is also a posthumous, but incomplete, one of Walker's, containing descriptions of other and allied species (Entom. viii. 15). In Sir S. Saunders' present memoir, a history of the *Agonidae* is given, and the altogether abnormal and apterous male is described as the partner of Westwood's ordinary-looking, chalcideous *Sycophaga crassipes*.

The meetings of the Society during the last year were well attended. Several interesting exhibitions were made, and some important discussions and remarks on these and on papers read were elicited, notably on Sir John Lubbock's paper and on several other phases of protective resemblance brought up through various exhibitions. The Proceedings for 1878 will therefore be found to contain much both of scientific and general interest. The minor papers included are:—Further notes on various insects, both from Dr. Fritz Müller and Mr. J. P. Mansel Weale; these respectively from Brazil and South Africa. The Rev. T. A. Marshall's "Notes on the Entomology of the Windward Islands" contain many interesting remarks on the habits of various insects, besides giving a list of all the species noticed and included in the collection sent to the Society. Mr. J. W. Slater contributes some remarks "On the Secondary Sexual Characters of Insects," and Mr. A. H. Swinton "On the Expression of the Emotions by Insects." M. Lichtenstein submitted a digest of his researches into the cycle of life of "*Phylloxera vastatrix* and other Plant-lice." Mr. Dunning read a "Note on Spiders resembling Flowers;" and there is Mr. McLachlan's report on the condition of the Linnean Collection, occasioned through some remarks from the late Mr. F. Smith; together with the report of the Committee (Messrs. McLachlan and Waterhouse) on the ravages of *Anisoplia austriaca* amongst the corn crops of South Russia. This last was in answer to a report sent home by the late Mr. Carruthers (Her Majesty's Consul at Taganrog), and was transmitted to the Society through the Board of Trade. This is a move in the right direction, which we hope will be followed when information is again required on injurious or other insects.

Many other objects and facts were brought before the Society's notice, such as sexual dimorphism in *Erebia Medea*, by Mr. H. Goss; the "jumping seeds" inhabited by the larvæ of *Carpocapsa*

saltitans, by Mr. J. Spiller; *Cetonia aurata* and a lepidopterous larva (*cf.* Entom. v. 185, 200) as potato enemies, and various insect monstrosities, by Prof. Westwood; together with two or three general collections from various localities, many rare species of British Lepidoptera and Coleoptera, and several examples of colour and other variations in Lepidoptera, &c., but they cannot be referred to here.

From this varied summary it will be seen that the Entomological Society continues to do good work in several directions, and well deserves the support of all entomologists. The advantages of membership held out are great, and we hope that Mr. Bates' appeal in his presidential address may have the effect of attracting many of "the notoriously large number of entomologists in the United Kingdom, who hold aloof from us," to join its ranks; also that many other of Mr. Bates' valuable suggestions may bear good fruit. The following are the officers and council elected for this year:—President, Sir John Lubbock; Treasurer, J. Jenner Weir; Librarian, F. Grut; Secretaries, R. Meldola and W. L. Distant; other members of Council—H. W. Bates, J. W. Dunning, Rev. A. E. Eaton, E. A. Fitch, E. Saunders, F. Smith, S. Stevens, and J. Wood-Mason.—E. A. F.

Species des Hyménoptères d'Europe et d'Algérie. Par ED. ANDRÉ, chez l'auteur, à Beaune (Côte-d'Or). 1879.

A SHORT time since we received the prospectus of this work. The project was, we feared, almost too good. It aimed at producing a series of monographs on the different families of Hymenoptera, illustrated with coloured figures of one or more species of each genus, accompanied with full biological history, and simple dichotomous tables of the species. These were to appear in periodical form, and were eventually to form a complete work on the European Hymenoptera. It was to be a subscription work, and to appear in quarterly parts, each of which is to contain eighty octavo pages of letterpress and three plates. It is written in French; and the price of the four numbers, or the yearly subscription, is now 18 francs (= 14s. 6d.) for the Postal Union. It was proposed to commence with an exhaustive Introduction, and then to follow on with the *Tenthredinidæ* (sawflies).

Such was the scheme which has soon been carried into effect.

The subscription list was to close on January 15th, 1879, and we have just (March 27th) received the first part. This is of the promised size, and three plain plates very clearly illustrate the structure of the head, antennæ, and thorax. The Introduction commences with a few pages on Entomology in general, but soon proceeds to the Hymenoptera in particular. The subjects already treated of—viz., collection, preservation, and structure—are well and concisely considered; and we sincerely hope that this homely work will not fall short of the ideal which is attempted. Homely, because dedicated “à la mémoire de mon père, à ma mère,” and printed “chez l’auteur,” who promises that “all my time, all my efforts and all my will, both are now and ever will be at the service of this work; which will be the work of my life.”

We heartily wish M. André may be enabled to carry out his good intentions, and bring the work to a successful completion. Other methods of publication might have been preferable; but the necessity for a competent work on European Hymenoptera is great; and we hope that this labour of love may not have been undertaken in vain.—E. A. F.

Notes of Observations of Injurious Insects. Report, 1878.
London: West, Newman & Co., 1879.

THE present report shows that this praiseworthy undertaking continues to meet with success. Much more, however, might be accomplished; and we look upon it as almost a duty for practical entomologists to support Miss E. A. Ormerod, and to favour her or her colleagues with the results of their observations. The twenty-seven pages of the 1878 report contain much valuable information; and we see that in addition to the hitherto sixteen specially noted species, five others are to be included. These well-known destructives are two craneflies (*Tipulæ*) and three weevils (*Otiorynchus*, *Bruchus*, and *Sitones*).

It has been said that insect injury in Britain is so slight that it is unnecessary to seek its limitation. Many practical farmers will, we fancy, hardly endorse this opinion; and even if they did, surely the easier the task the greater the discredit both to British entomologists and to British agriculturists for the negligent performance of it. Miss Ormerod's disinterested labours are happily turned in this direction, and deserve, if they cannot command, every success.—E. A. F.

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CONSIDERATIONS AS TO EFFECTS OF TEMPERATURE ON INSECT DEVELOPMENT.

By E. A. ORMEROD, F.M.S.

IN the great difficulty of gaining information as to circumstances accompanying insect appearance in abnormal quantity, it seems worth while to consider whether something more might not be learnt about insect life (as it most certainly might about plant life) by greater observation of ground temperatures. There are certain atmospheric conditions, both as to amount of moisture and warmth, well known to entomologists, and which can be proved to affect development in various ways, but the popular ideas on these matters (and, unfortunately, too often amongst those most practically concerned in their effects) frequently lead exactly in the wrong direction; if we could, therefore, gain some exact data of temperature at the surface of the ground and a foot or two beneath it (as far down, that is, as insect presence might be presumed usually to exist), it might be very useful.

With regard to simple continuance of larval existence during cold as severe and as long continued as it can be ordinarily subjected to in this country, the last winter showed us that the larvæ of many of our various injurious insects (and notably those of *Cetonia aurata*, the rose chafer, which, from its succulent nature and great size might be supposed both to feel and to show injuries from frost very readily) are to all appearance uninjured by a temperature low enough to freeze the ground into a firm mass, and ranging from somewhat below nine degrees (that is, twenty-three degrees of frost) on the ground level, to about thirty-two degrees (that is, what is commonly known as freezing)

at a foot beneath the surface. But looking on from the mere existence (uninjured) of the larvæ through winter cold, to the conditions of summer vitality, when feeding, growth and change of form are in active progress, we can lay our hands at once on proof of circumstances of temperature cooler than suit the constitution of the grub, in some cases retarding the date, or interfering with the healthiness of its development.

We greatly need to know, for practical purposes, what these temperatures are, for it does not seem at all admissible to apply a general rule. In the case of the much-vexed question of the Colorado Beetle, we have information (pages 2 and 3 of the 'Seventh Annual Report on the Insects of Missouri,' by C. V. Riley) that the crop was entirely free from injury by these insects above the altitude of about eight thousand feet. The bodies and eggs, and recently hatched larvæ, were to be found, but dried and dead, "which is probably due to the very dry atmosphere in connection with cool nights." With some noticeable lepidopterous and dipterous examples the rate and healthiness of development may be traced in parallel sequence with the amount of accommodation (so to call it) afforded according to their constitutions during the time of rapid larval growth, or pupation; but it is very difficult to proceed onwards as to what may happen to species not easily noticeable, from the transformations taking place under ground. We have a well-known instance, however, amongst the ants (easy to be observed in *Formica rufa*) of the undeveloped insects being constantly moved so as to secure them the greatest available amount of sun-warmth by day and ground-warmth by night; and though, perhaps, I should ask to be excused in taking up time and space in what may be mere conjecture, yet it seems not impossible that observations of temperature on the ground level, and also taken with earth thermometers at the depth of one foot, and of two feet, beneath the surface, might throw some light on the causes for the varying depth at which larvæ of one species may occur (with consequently varying opportunities of mischief); on retardation of development, or the contrary; and many other matters, which would be serviceable as well as interesting.

In the case of the somewhat rare beetle, *Clythra quadripunctata* (the parasite or inquiline in the nests of *Formica rufa*), and of the still rarer *Rhipiphorus paradoxus* (parasitic in the

larvæ of *Vespa vulgaris*), I have met in each case with a single instance of their appearance in such unusual numbers in circumstances of unusually raised temperature, or protection from external influences, that perhaps some of the details may be worth noting.

The *Clythra quadripunctata* is said, by Stephens (Brit. Ent. iv. 354), to be not uncommon in certain places within the metropolitan district; but at Sedbury, in West Gloucestershire, where I found this beetle in great numbers towards the end of April, 1872, I had only seen two specimens previously, though the fir wood abounded with nests of the wood ant, and I was in the constant habit of observation. The nest from which the *Clythra* appeared was quite exceptional in size, being nine paces, of nearly a yard each, in circumference, and was formed (not in or on a decayed stump) simply of sticks and rubbish piled in a great heap on the grass just outside the wood, where it was exposed to rain and (during about half the day) to sunshine.

On the 24th of April I found the *Clythra* in great numbers, mostly in pairs, on the grass by the nest; and they continued to appear so numerous on that and the following days that I took thirty at a time, and returning again and again at short intervals, found them still appearing—far more than I cared to take. Being desirous of making out the locality of the larvæ and pupæ, I went to the nest about 10 a.m., before the ant-cocoons had been brought up for the day, and, opening the mass carefully downwards with my hands till I came to what may be termed the nursery of the nest, there, amongst the ant-cocoons and larvæ, I found the flask-like cocoons of the *Clythra* in great numbers, formed, as far as I was able to judge by their texture, of minute morsels of the surrounding matter (chiefly vegetable *débris* from small sticks) glued together by the larvæ. Some of the beetles were still not advanced beyond the larval stage, lying curled like small cockchafer grubs in their cases; and, from the much-gnawed state of a few of the ant-cocoons after the beetle larvæ had been confined amongst them for a night, I conjecture *Clythra quadripunctata*, in its larval state, to be carnivorous. Kaltenbach ('Pflanzenfeinde,' p. 612) mentions that the larva of this species is, according to Dr. Rosenhauer, found in ants' nests, and is "fostered there by the ants"; but as far as I could judge from

this instance, the cares of the fosterers, if voluntary, were very ill repaid.

The chief matter, however, was the temperature. On first examining the nest, I passed my bare arm well down to a considerable depth, and found the centre of the mass of material so warm that I withdrew it hastily, thinking I might have put it in the lair of some animal. I do not know what amount of heat usually exists in the centre of the wood ants' nests (as far as I have observed, they usually have a temperature raised in some degree above the outer air), but in this case the great mass of material capable of some degree of fermentation, heaped together where it was exposed to strong sunlight and the coincidences of thundery weather, would account for the much greater warmth. I had not a thermometer with me, but a temperature that feels strikingly warm to the arm, itself raised in temperature by much exertion, must be considerable, and by such tests as I could apply afterwards with a thermometer at hand, I estimated it to be about seventy degrees. This was at about two feet beneath the surface of the nest, and would give a temperature more than twenty degrees above what has been shown here (in the neighbourhood of Isleworth during April of this year) by earth thermometers at one foot and two feet beneath the surface; or, taking one of the warm months of the year as a general guide to earth temperatures, about ten to fifteen degrees above the amount shown at the same depth during last September.

The appearance may, of course, have been only coincidental; but still, looking at the unusual amount of protection from external chills, and also the unusual amount of internal warmth, in connection with the enormous numbers of the *Clythra* where they were usually scarcely represented, it may be worth recording.

With regard to the *Rhipiphorus paradoxus*, I found this beetle present in great numbers early in September, 1870, in a large nest of *Vespa vulgaris*, and being at the time securing all the specimens I could meet with for presentation to the Collection of Economic Entomology then forming at South Kensington, I had the opportunity in clearing the combs, cell by cell, of accurately observing their contents. The nest was of unusual size and in a very dry and warm situation, as well from the general formation of the ground as from being in well-kept grass land in the park

at Sedbury, Gloucestershire, without any overshadowing from trees or bushes; the special locality was partly in the stones of a rough dry drain, partly in hard lias clay at about a foot beneath the surface, and three feet from the opening of its gallery-thoroughfare. It contained six or more combs of more than a foot in diameter, the later ones being irregularly made as if under some disturbing influence (as I have found them in a deserted nest of the tree-wasp); and in these, with the exception of one or two developed beetles, I did not find any specimens of *Rhipiphori*. In the other combs—those composed of workers' cells—I found great numbers of *Rhipiphori* in various stages of pupal condition, from the earliest state, still white and soft, to the appearance of colour, and onwards to full development. Their number was beyond what I could calculate. The wasp-comb being required cleared of living contents, I went over each comb with a pair of pointed forceps, tearing the caps off each of the cells and removing the contents, and had thus a complete opportunity of inspection; and the *Rhipiphori*, being plentifully scattered in all parts of all the small-celled combs, must have been exceedingly numerous.

In the few cells which I left unopened in all the combs (for purposes of further confirmation of my own observations), and forwarded to Mr. A. Murray, he informed me that he found from sixty to seventy specimens of *Rhipiphori* developed or still as pupæ. These combs and illustrative specimens are (unless recently removed) still to be seen in Case LVIII. of the Collection of Economic Entomology at Bethnal Green.

As with the *Clythra*, the appearance of the *Rhipiphorus* may have been dependent on many unknown circumstances, still it is in striking coincidence with apparent fostering protection afforded by the abnormal state of the containing nests.

The extraordinary ignorance and perversion, or absolute inversion of correctness, in the views prevalent with many on insect development, make the popular ideas on these subjects unfortunately of little value; still there is sometimes a foundation (though not necessarily the supposed one) for a widespread belief; and it would be a most useful and acceptable addition to our information, if (after the recent severe winter and spring, still, at the beginning of May accompanied by temperatures reaching little above twenty degrees at the ground level) we

could have reports during the coming season of the dates of general appearance, the quantity, and condition of the ordinary farm insects; and also whether, in garden and farm operations, the larvæ are found at lower depths than is usually the case.

Unnatural circumstances, whether of temperature or surrounding conditions, are almost certainly prejudicial to life, or at least to health; and the cold which causes a larva capable of voluntary motion to bury itself beyond the usual depth, puts it in unusual circumstances as to atmospheric effect, moisture, food, and other matters calculated in some cases to retard development, in some to militate against its return in imago form to the surface.

It appears possible that in these abnormal conditions we might find the clue to the (at present) unaccounted-for appearance or absence of many of our insects; and, if I may be allowed to prefer the request, I should like to mention the pleasure it would give me to be favoured, in the course of the season, with any notes on these points, which, by collation with those of temperature, and comparison with those of other districts, could not fail to be a most valuable addition to the information which I trust the coming season will supply on the subject of the presence of "Injurious Insects."

Dunster Lodge, near Isleworth, May 2, 1879.

NOTE ON THE HABITS OF *RANATRA LINEARIS*.

By ABBOTT G. LAKER.

DURING the last few months I have had the opportunity of observing the habits of *Ranatra linearis* in its imago stage, and a note of the peculiarities of this curious insect may be of interest. It is very slow and sluggish in its movements, and will cling to the weeds, generally at a depth of only a few inches under water, but sometimes close to the surface, for hours together; remaining perfectly still except when it rises to breathe, and even then it only moves just sufficiently to enable it to protrude the tip of its anal filament slightly from the water, and after taking a fresh supply of air immediately it crawls down again and remains stationary as before. Even this limited degree of motion is not necessarily often repeated, for (from

observations during November) I find that the intervals between each inspiration vary from a few minutes to as long a time as fifty-six or sixty minutes, the average time being something over half-an-hour. The usual position is with the head downwards, the body being held in a slanting or almost vertical position. Occasionally the body is carried horizontally, but I do not remember ever to have seen a *Ranatra* resting with its head uppermost.

The movements to the surface are usually effected by the insect crawling slowly backwards, directing its motion upwards by means of its long legs, with which it contrives to grasp the aquatic plants. It will, however, occasionally let go its support and float to the surface, by the lightness of its body, but this is commonly only done when the tail has become obstructed by the weeds with which it is surrounded.

Notwithstanding its slight specific gravity and the form of the legs, which are ill adapted for such progress, the *Ranatra* can swim downwards through the water, but only slowly and with apparent difficulty, moving its second and third pair of legs in unison; when the second pair are moved forward the hind legs are projected backwards: but although the tibiae of the middle and posterior legs are fringed with two rows of short hairs, these members seem to offer a good deal of resistance to the water.

In swimming the fore legs are of little or no assistance, being only used occasionally to grasp objects within the reach of the long claw-like tibiae and tarsi; indeed the purpose served by the fore legs seems to be to catch and hold prey, and the claws are sometimes employed as combs to remove any impurities about the head and neck; but as predatory organs they are most effective. Their action in seizing an insect is quick and decisive; indeed it is only in this act and in warding off the approach of an object of alarm with these same members that anything like celerity of movement is to be observed in *Ranatra linearis*, except, perhaps, in flight, which I have not witnessed. When taken out of water and placed on any rough substance the *Ranatra* walks slowly and somewhat awkwardly, using the second and third pairs of legs in pairs as in swimming, carrying the body high from the surface over which the insect is progressing. The fore legs are admirably adapted for holding small insects. The flattened femur is grooved along one edge and the raised margins

of the groove are set with small teeth something like those of a saw; the tibia and tarsus slants down into the canaliculated femur, the former being roughened. The inner rim on the femur where the tarsus comes, when the claw is closed, is raised into a small triangular spike, and this would seem to be of service as a catch and support for any object which, from its size, prevents the tibia and tarsus from fitting down into the groove in the femur. I have been much struck with the firmness of the grasp on its prey obtained by this insect: on one occasion I placed some sticklebacks in the glass with a *Ranatra*, when one of them, about an inch long, was seized (the total length of the *Ranatra*, exclusive of its anal filament, being only eighteen lines), and notwithstanding the fish's repeated and vigorous struggles it was held fast. I then took hold of the stickleback and raised it out of the water: the *Ranatra*, however, would not let go, and was drawn out of the water with the fish. I forcibly separated the two, replaced the insect, and, immediately afterwards, the fish; but the latter was again seized in a very short time, and the insect continued its meal. The entire absence of fear displayed under unusual circumstances by the *Ranatra* (in common with most other water insects) is noteworthy, and on one occasion a *Ranatra* placed, soon after capture, in a vessel of water, within a short time commenced feeding.

The *Ranatra* never seems to move in search of food; it waits patiently, with its fore legs extended, ready to seize any small insects coming within its reach; it is not by any means voracious, and a specimen which I have kept for about six months, feeding it chiefly on blood-worms, often refuses its food altogether; and, even if a blood-worm is presented to it, so that it is grasped by the *Ranatra* the latter will often release the larva; at other times it will readily take the proffered object and continue to suck its juices until nothing but the skin of the blood-worm appears; this occupation occupies generally about two hours, and a blood-worm a day, or even less, seems to satisfy the requirements of the insect. These observations refer to November and December: its rapacity may be greater during the warmer months. I have seen a *Ranatra* seize and kill a diving spider (*Argyroneta aquatica*), and I have fed it on *Notonecta*. It has also seized small water-beetles, such as *Hyphidrus ovatus* and, in this case, it turns the beetle round and round, as though to find a weak part,

and applies its rostrum to the extremity of the abdomen of its victim, but whether the *Ranatra* succeeds in killing the beetle I am not aware. I have kept a *Ranatra* in the same vessel with *Dytiscus marginalis* for a week or two together without the latter attacking it, although they have repeatedly come into actual contact; but it is quite probable that if the *Dytisci* were hungry they would make short work of the *Ranatra*, as they do of *Notonectæ*, *Corixæ*, &c., on occasion. The curiously lengthened and flattened form of *Ranatra linearis*, together with its yellowish brown colour and its habit of remaining motionless and in a slanting position among the grass-stalks or water-weeds in its natural ponds, render it somewhat difficult of detection in such situations; I have wondered whether these peculiarities are a protection to the insect, from which its slow movements would not enable it to escape, but I have not been able to discover any water animal that it has to guard against. I may, however, mention that when a *Dytiscus marginalis* comes in contact with the *Ranatra*, the latter raises its fore legs as though to ward off the beetle.

The imago, which I have kept within doors from June to the present time, shows no signs of torpidity during the winter months, and I have taken a specimen of *Ranatra linearis* from a pond on March 9th, from which I should infer that it may be found active during the whole of the year.

Clunie House, Court Hill Road, Lewisham.

INTRODUCTORY PAPERS ON LEPIDOPTERA.

By W. F. KIRBY,

Assistant-Naturalist in Museum of Science and Art, Dublin.

No. XIV. NYMPHALIDÆ—NYMPHALINÆ.

(CALLIZONA to PYRRHOGYRA.)

WE are still treating exclusively of South American species; and the three next genera, *Callizona*, *Gynæcia* and *Ectima* are widely distributed, though very poor in species, and are closely related to each other. Their habits are all very similar, and they are very fond of settling on the trunks of trees, though *Ectima* expands its wings flat, and the others sit with their wings raised. *Gynæcia Dirce* is the commonest and most widely distributed of

the group, ranging over the greater part of South and Central America. It is a rather robust-looking insect, and expands from two to nearly three inches. The wings are entire, the fore wings triangular and obtusely pointed, on account of the hind margin running rather obliquely to the hinder angle. The costa and hind margin of the hind wings form almost a right angle with the apex rounded off, and there is a projecting lobe at the anal angle. The wings are uniform brown, and the fore wings are crossed by an oblique bar, varying from pale yellow to dull orange, running from the middle of the costa to the hind margin, just before the hinder angle; the tip of the wing is blackish. On the under side the transverse band is paler, and the whole of the wings are beautifully striped and reticulated with brown and grey. The hind wings are bordered with yellow, intersected by a brown streak; the lobe is marked by a black spot pupilled with blue; and the outer portions of all the wings are crossed by indistinct traces of a row of eyes with blue pupils, which are best marked towards the tip of the hind wings.

Callizona Acesta, and the species or varieties which have lately been separated from it, are smaller insects, rarely expanding as much as two inches; and the hind wings are rounded. They are tawny, with obscure dark transverse lines, and the outer half of the fore wings is obliquely black, with an oblique yellow stripe within it, and some white or yellow spots nearer the tip. The fore wings are tawny, striped with black towards the base, and black towards the tip, with the oblique stripe and some yellow markings beyond; the under side of the hind wings is pearly grey with brown transverse bands, and is thus very similar to that of *G. Dirce*.

The species of *Ectima* are smaller insects, expanding about an inch and a half. They are brown, with darker transverse lines, and there is an oblique white band on the fore wings; nearer the tip are generally some small white spots on a black ground, but scarcely forming well-marked eyes. There is sometimes a row of similar white dots on the outer portion of the hind wings, which are drab beneath, with some slight transverse brown markings. *E. Iona* is glossed with purple above.

The species of *Pandora* are large insects, expanding about three inches. The wings are not dentated, but the hind margin of the fore wings is more or less concave. They are black, with a

brassy green band beyond the middle on all the wings; towards the base they are darker green, intersected by numerous rather broad black lines. The under side of the hind wings is of some shade of red; sometimes spotless, and sometimes with transverse lines, and a submarginal row of black dots or rings. They inhabit the west of South America, and Mr. Bates describes their flight as very rapid.

Batesia Hypochlora, and its allies or varieties, are still larger and more splendid insects from the Upper Amazon and Ecuador. The fore wings are black, with the basal third blue, and a very large red oval transverse spot or band running from below the costa three-quarters of the distance to the hinder angle. The hind wings are blue above, with a submarginal and rather narrow black band; beneath they are olive-yellow, or greenish, with the submarginal black stripe narrower than above. I have no information respecting their habits.

The genus *Ageronia* contains many common and well-known species from Tropical America. It was at first formed into a separate family, and was placed by Doubleday between the *Pieridæ* and *Danaidæ*, owing to an erroneous statement that the pupæ were attached like those of the *Papilionidæ* and *Pieridæ*. But Mr. Bates discovered that the pupæ were suspended by the tail; and *Ageronia* was then removed to the *Nymphalidæ*. The perfect insects frequent forests, and are remarkable for the cracking noise they make with their wings during flight, a peculiarity first noticed and recorded by Mr. Darwin. The butterflies expand from two to three inches; the fore wings are generally rather short, with the hind margin very slightly concave, and the hind margin of the hind wings slightly dentated. They are mottled with black, bluish, and white, and are sometimes marked with dull reddish spots; and there is generally a submarginal row of black eyes, with white pupils on the hind wings. Some species are velvety black above, spotted with blue; or very deep blue, spotted with paler, and with an oblique white band on the fore wings in the females. The under surface of the hind wings varies from pale silvery grey, with a row of submarginal brown rings, bordered on each side with a brown line, to yellow, red, brown, or steel-blue; spotted with red in various species.

The genus *Didonis* contains a few brown butterflies, expanding about two and a half inches, with the hind margin of the fore

wings rounded, and that of the hind wings dentated. The hind wings are marked with a conspicuous red submarginal band, and are spotted with red at the base beneath. The species are all from Tropical America, and greatly resemble each other.

The species of *Olina* have much resemblance to the Danaid genus, *Ithomia*, and expand about two inches and a half. Their wings are long and entire, brown or black, with white basal stripes, and large white spots beyond them on the fore wings, and with a white stripe varying in breadth crossing the hind wings, which are also crossed near the base by the basal streak, when it runs obliquely and extends to them. On the under surface the wings are partly bordered and crossed by narrow rufous stripes, as in various *Ithomiæ*. They inhabit the Amazon district, Bolivia, &c.

The genus *Cystineura* contains a few small species, the largest of which expand less than two inches. The fore wings are long and the hind margin much curved, so that they form an obtuse-angled triangle, with the costa much longer than the inner margin. The hind wings are rounded and slightly dentated; they are varied with pale brown, white, and orange, and there is always a white band across the hind wings beneath, divided by the nervures, and frequently more or less visible on the upper side. The species are found in the West Indies and North America. One of the prettiest is *C. Dorcas*, which is white, with the upper part of the fore wings liver-coloured, with a long orange spot at the base of the costa, and an orange line at the end of the cell; and all the wings broadly bordered with orange.

The genus *Lucinia* only includes two West Indian species, expanding nearly two inches. They resemble the genus *Catagramma* in appearance, being orange or pale red above, with the tip of the fore wings black, with a large spot of the ground colour. There is a black blotch near the hinder angle, and another at the end of the cell. On the under side, also, they much resemble *Catagramma*, the hind wings being marked with two large eyes in a similar manner; but they may be at once distinguished from anything resembling them by the strongly dentated hind wings.

Pyrhogyra, the last genus we shall notice in the present paper, contains several common South American species, which show some resemblance to *Limenitis*; they expand about two

inches, or a little more or less; but the wings are broad, the hind margin of the fore wings slightly concave, and the hind wings dentated, and sometimes with a projecting tooth in the middle. They are black, with a broad white or green band across the middle of both wings, divided in two on the fore wings, and with a smaller spot of the same colour nearer the tip. The pale markings are bordered beneath with brown borders, divided with red, and there is a red spot at the anal angle of the hind wings, except in the smallest species, *P. Irene*, which is black and white above without any shade of green, and the white markings are bordered below with black and tawny instead of red. All the genera in this paper are South American.

LIFE-HISTORIES OF SAWFLIES.

Translated from the Dutch of DR. S. C. SNELLEN VAN VOLLKNOVEN,

By J. W. MAY.

(Continued from p. 106.)

SELANDRIA CEREIPES, *Voll.*

Larva and imago unknown.

Selandria nigra nitida, clypeo et cenchris albis, pedibus cereis, areola lanceolata aperta.

Long. 6 mm. Exp. al. 13 mm.

This new species is, without doubt, most nearly related to *Selandria stramineipes*, Klug., which is described in 'der Gesellschaft naturforschender Freunde zu Berlin Magazin,' Achter Jahrg. p. 75 at No. 62, and is also mentioned by Hartig in his well-known work on sawflies, at page 282. Our species is so nearly allied to the German insect that I was for a long time in doubt whether it should not be considered as a variety of the latter. I have, however, come to the conclusion that the difference is sufficiently great to be accepted as establishing a specific distinction. For my acquaintance with both larva and imago I am indebted to my friend, Mr. E. E. de Roo van Westmaas, who sent me several larvæ, in various stages of growth, on the 26th August, 1869, which he had taken on *Lastrea Filix-mas*. Three of these larvæ, at different stages, are represented at fig. 1, of the natural size and colour; it will be

seen that some were reddish yellow, some greenish yellow, and others green. The largest of those I had was 14 mm. long, and from this example I have drawn up the following description:—Head round and shining, sordid brownish yellow, partially withdrawn into the first segment; mouth somewhat darker in colour, tips of the jaws brown; eyes placed in rather large round black spots. Body strongly wrinkled on the dorsum and regularly decreasing in thickness from the head backwards, colour yellowish green, darker on the dorsum as far as the line of stigmata; the margins of these latter were of a darker tint, but were difficult to make out; they appeared to me to be elliptic in outline. There were twenty-two legs, the six prolegs being glassy yellow and having the claws brown. Neither spines nor other processes were observable near the anal valve.

In some few examples the head was greenish gray; in some a line of a lighter tint, but somewhat darker at the sides, extended along the middle of the dorsum; in others the dorsal line was of a purple tint; the one figured was entirely without any dorsal line, and this was the case with most of the larvæ. My larvæ for the most part spun up in the mixture of sand and mould covering the bottom of the glass in which I had kept them; in the following year, however, nothing appeared from these cocoons, on opening one of which a shrivelled larva was found nearly dead, as represented, enlarged, at fig. 4.

I should now have been quite unable to give any further particulars about this species, had it not been for the kindness of my friend De Roo in communicating to me the results of his more successful attempt at rearing it. On the 11th July, 1870, I received from him twelve imagos which he had reared, together with a couple of cocoons: the latter resembling those which I had, still unhatched.

The cocoons (fig. 3) are single, rather hard, of a dark brown tint, covered externally with grains of sand, smooth and very shining on the inside. On sending me the insects Mr. de Roo wrote to me that the first imagos appeared on the 19th and 20th June, a large number coming out on the latter date; others appeared afterwards from time to time up to the 10th July, when the last was hatched.

The following is a description of the perfect insect:—Head broad, and, considering the size of the body, large, shining black;

on the forehead was a very smooth oval spot. Antennæ nine-jointed, black, as long as the thorax, and covered with extremely fine hairs. Eyes black, rather large and projecting; ocelli topaz-coloured. Labrum, and in many cases also the somewhat emarginate border of the clypeus, white; mandibles black, the remaining parts of the mouth yellow. Thorax without hairs, shining black, with the extremities of the collar and the tegulæ pale yellow. Wings very slightly clouded, iridescent (especially in the live insect), yellow at the insertion; nervures and stigma brown, the latter being of an obscure yellow tint below at the insertion, the second submarginal cell without a horny spot. Cenchri greyish white. Abdomen broad, shining black with an open triangular space at the base on the dorsum; some indistinct white spots at the sides of the anus. Legs yellow, with the exception of the terminal joints of the tarsi and the claws, which are brown.

I am not as yet acquainted with the male of this species, which appeared to us to be single-brooded, and which has hitherto been observed only in the province of Gelderland.

ENTOMOLOGICAL RAMBLES, 1878.

By J. B. HODGKINSON.

(Concluded from p. 128.)

ON another visit to Arnside the last week in June, larva-hunting among the young oaks, I took what I expected to be *Ypsolopha lucella*, but I was disappointed. I worked away and got a few scores, and they all came out *Hypolepia radiatella*. Then, noticing the young oaks quite yellow and withered in great bunches, the leaves being drawn together so oddly that I thought *Tortrix viridana* could never have done work of this sort, I opened some of these bunches, examined the larvæ, and was sure they must be a knot-horn; so, on the strength of this idea, I filled my large inside pockets and took them home, threw them on my room floor, having out-reasoned myself again, saying, "They are too common to be anything else but the green *Tortrix viridana*;" but I sent larvæ to my friend Mr. C. G. Barrett. No reply coming from him, through some inadvertence or other, made me more sure that they were only *Viridana*; but again I thought, after throwing

them in my room, they must be knothorns. So off I went with a pillow-slip to fill with more, but when I got a lot in it I emptied my bag on the spot and left them, thinking after all they could only be some oddly-shaped *Viridana* spun leaves. Having had a seventy-mile trip, and thrown them all away, judge of my chagrin in two or three days after on seeing some fine *Rhodophea consociella* and others crippled, sticking on the walls in my room. However, I got a fine series of three dozen all right. This is the first occurrence so far north that I know of.

At the same time I found over a hundred *Psychoides verhuebella* out; I had brought a lot of hart's-tongue home with a great quantity of cases and larvæ on. This species seems to breed best by being kept very dry; in fact, the leaves were all as dry as tinder. Before this I always kept them too damp, and hence my bad luck in breeding quantities.

July came with fine hot weather, but I had an attack of rheumatism, which made me unable to walk much. However, with plenty of time and plenty of pain, I made another visit to Arnside, and met with *Sericoris cespitana* in plenty, and also with some *Sericoris conchana*; both of which were new to the district. I looked assiduously for *Emmelesia taniata*, both at Arnside and Grange, but to no purpose. I then set off to Windermere, and spent ten days in that locality for *Taniata*, but none put in an appearance until worn, as usual. The weather being hot and calm, and no rain at all,—a very unusual thing in the Lake District,—gave me better hopes that my rheumatism would leave, but not so; my left arm became quite useless, and I could only walk a few yards at a time. I took my son with me in a boat, and made for a little corner where I had seen some balsam (*Impatiens*) the previous autumn among some old dead sticks and nettles. The place was then perfectly dry; I got a stone to sit on, and took a candle to look on the plants for several nights, and was fortunate to take seven specimens of *Cidaria reticulata* just as they fluttered up at dusk; I did not get one after dark. We had the grandest of weather, but no moths—only three *Hypenodes costestrigalis*, two or three "Snouts" (*Hypena proboscidalis*) and *Ypsipetes clutata*, and a few *Scopariæ*. Towards the end of the month *Taniata* was stirring pretty freely, but no good ones; so I kept the females to lay eggs, which they did pretty freely. The young larvæ made their appearance in about three weeks

after, but what to feed them on was the rub. Having given a history before in your pages as far as I then knew, I can only add that the young larvæ seemed to take best, before hybernation, to a small flowering moss that grows by the side of wet rills. One changed in October, and another grew half an inch long; the others only about one-fourth of an inch, and since then they have not been seen. I expect them to creep up now shortly. As the larva is not known to any one, I purpose, if any more grow up, to get a correct drawing made for your magazine, for it will then be seen by the many, and not locked up from the world. My visits after this were chiefly larva-hunting, up to the end of October, among the *Hypericum*. In the wet woods *Nepticula septembrella* was in nearly every leaf. Several journeys I made looking for fresh localities for the balsam; but last year, through some cause or other, the plant was a failure. It was suggested to me by a botanist that the weather was so cold in the autumn of 1877 that the seed never got ripe: be that as it may, I had over seven hundred miles of rambles in one fortnight to no purpose at all. I had got a few larvæ, but their number and species are soon gone through; and I suppose I have now the results to bear of my larva-hunting in the Lake District, where fog and rain in the autumn months prevail, by being confined to my house for the last ten weeks with rheumatism.

Beech House, Dutton, Ribchester, Lancashire,

April 12, 1879.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES ON THE GENUS ARGYNNIS.—In Edwards' 'Butterflies of North America,' three species of the genus *Argynnis* are figured, in which the male is of the ordinary fulvous and black colour of the genus, but the female approaches more nearly to the colour of *Argynnis Paphia*, variety *Valezina*. The species in question are *A. Diana*, *A. Nokomis*, and *A. Leto*. At the end of the author's description of the last-mentioned, he states: "The contrast between the sexes in this species is of the same nature as in *Diana* and *Nokomis*, and it is a very curious problem how the sexes in these species have come to differ so remarkably, when in nearly every other member of the extensive genus *Argynnis* they are essentially alike." As to the cause of Melanism I am not

able to offer any explanation, but in the case of *Argynnis Paphia* the ordinary form of female is of a decidedly greener hue than the male, so that the colour of the sexes does slightly differ, but in the variety *Valezina* the difference in colour from the male is quite as great as in the case of the three species before adverted to, and it is also well known that a male *Valezina* has never been captured. It is a very singular fact that *Valezina* is scarcely ever taken in any part of England but the New Forest, and I am informed that it rarely if ever occurs on the Continent. If, therefore, the New Forest were isolated from the rest of England, and any circumstances in the environment favoured in the struggle for existence the females having the dark green and black coloration of *Valezina*, I see no difficulty in believing that ultimately a species would be established in which the coloration of the males and females would differ as much as in those mentioned by Edwards. I have observed that the females of *Paphia* are very sluggish, and, on the contrary, the males are very active; it might be an advantage to the species that when the female rose on the wing, her colour being different from that of the male, she could be more readily detected, and would, therefore, have a better chance of being fertilized than females which were not so conspicuously coloured; I am quite certain that butterflies do discern colour. I once saw a specimen of *Pieris napi* stop in its flight and descend upon a piece of white crockery; and I have also seen a reddish brown leaf attract to the ground a male *Melitæa Euphrosyne*. The coloration in many British butterflies, particularly amongst the *Lycænidae*, in which group the females are generally much duller in colour than the males, would lead to the belief that it is an advantage for the former sex to be of a more sombre colour than the latter. This would be the case were *A. Paphia* so differentiated that the females were always of the hue of *Valezina*.—J. JENNER WEIR.

LYCENA BOETICA.—With reference to the notice in your number for March of the capture last year of *Lycena Boetica*, it may interest your readers to know that while looking through some boxes of insects belonging to a friend of mine, I found, amongst a number of common English insects which he had purchased of a local collector on the Cotswold hills, a specimen of *L. Boetica*. My friend had long lost sight of this Cotswold

collector, but assured me that he was not a person who was at all likely to have purchased the insect, or obtained it otherwise than by capture. My friend supposed it be a hairstreak until I informed him as to its identity. It is now in the fine collection of Mr. A. F. Sheppard, of Lee, for whom I obtained it; and from my friend's account of it I entertain no doubt but that it is also a really British specimen of *L. Bætica*.—SAMUEL MCCAUL; Blackheath Club, Bennett Park, Blackheath, April 25, 1879.

INSECT HUNTING IN ABBOT'S WOOD.—The very interesting account of the New Forest that has lately appeared in the 'Entomologist' (Entom. xii. 75, 96, 120), under the title of "A Lepidopterist's Guide to Lyndhurst," cannot fail to have excited in the breasts of many youthful entomologists a longing to visit the beautiful spots so faithfully described by Mr. Bernard Lockyer. Two difficulties, however, generally stand in the way—time and expense. Many a young clerk, tied to his desk in the bank or the merchant's office, can only get a day's holiday at the most; and the question with him is where to go in the shortest time, at the smallest possible expense, with the greatest certainty of taking a large number of species. My object in writing these few lines is to answer this question. A journey to Brockenhurst or Lyndhurst averages three hours, at an expense of twenty-two shillings. The wood that I shall name can be reached in one hour and forty minutes, at an expense of nine shillings and eightpence. This wood, almost equal in beauty to the New Forest, is known as Abbot's Wood, and is within twenty-five minutes' walk of Polegate, a station on the London, Brighton, and South Coast Railway. One of the company's fastest trains (the "paper train") leaves London Bridge at 6.40 a.m., and slips carriages at Polegate at 8.20. A train returns from Polegate at 9.42 p.m., arriving at London at 12.5. My imaginary clerk may, therefore, spend the entire day at the scene of action, with time also for some sugaring. To find the best road to the wood, ask any of the officials at Polegate to point out two red-brick villas known as "Sunnyside;" follow the road in front of these, and you will come into the Hailsham Road (the privet-hedge on your right hand and the old blackthorn on the left will repay attention). In front of you, on the left, stands a pinky-white cottage with a black slate roof; go on past this cottage down the road, and take the first turning

on your left—a beautiful and productive lane, leading by a stile at the top on the right hand into a field. This is the “White Field,” one of the finest sugaring-grounds in the county. *Ophiodes lunaris* has been taken here, and *Catephia Alchymista* hard by. *Melitæa Athalia*, *Arge Galathea*, and the three large Fritillaries swarm in good seasons. *Apatura Iris* may be seen with certainty every year (about 18th July), in the left-hand corner nearest to the wood. I know one particular branch of a certain oak which, year after year, is a favourite throne of the “purple monarch.” At the top of the white field (whence you get a lovely view of the sea) is one of the numerous woods that go to make up Abbot’s Wood—these are Gnat Wood, Folkington Wood, and Cophall Wood. Folkington Wood has lately changed hands, and it is just possible that some difficulty may be experienced about going over certain portions of it. The owner of the “pinky-white cottage” will, I am sure, give all necessary information on this head; and his son (a remarkably intelligent youth) knows the best spot where to look for *Apatura Iris*. The following is a list of the butterflies I have myself taken in the locality:—*Argynnis Paphia*, July 7th; common. *A. Aglaia*, June 28th; common. *A. Adippe*, July 2nd; common. *A. Lathonia*, September; once seen in the White Field. *A. Euphrosyne*, May 16th; swarms. *A. Selene*, June 4th; swarms. *Melitæa Athalia*, June 21st; common. *Vanessa Urticæ*, March, July, &c. *V. Polychloros*, March 20th, July 20th; common. *V. Io*, March 2nd, July 18th; common. *V. Atalanta*, May 17th, August 10th; common. *Pyrameis Cardui*, May to September; swarms in the wood, some years, in May. *Limenitis Sibylla*, July 19th; rare. *Apatura Iris*, July 18th to August 13th; plenty about the wood; use long pole; female flies low amongst sallow bushes. *Melanagria Galathea*, July 2nd; swarms in White Field, and common in wood. *Pyrarga Egeria*, April 13th, May and September; common. *P. Megera*, May 15th, August 2nd. *Epinephele Janira*, June 10th. *Satyrus Semele*, July 15th; occasionally in the middle of the wood; swarms on downs. *S. Tithonus*, July 7th. *S. Hyperanthus*, June 29th; common. *Cæronympha Pamphilus*, May 12th, June 3rd. *Nemeobius Lucina*, June 1st, 1876; very rare. *Thecla Rubi*, April 28th, May 28th; common. *T. Quercus*, July 18th; swarms after 5 p.m. *Polyommatus Phleas*, May 27th to October; common. *Agestis Medon*, May 21st, and

August; common. *L. Icarus*, May to October. *L. Adonis*, June 15th, and August; not in the wood, but common on the downs in places. *L. Corydon*, June and July; occasionally in the wood, swarms all over the downs. *L. Alsus*, June 15th; same remarks. *L. Argiolus*, April 30th, July 24th; sparingly. *Colias Hyale*, August 12th; rare in wood, sometimes common on downs. *C. Edusa*, June 4th to November 14th; common all over the wood and downs. *C. Helice*, var., August 22nd, occurs in the wood. *Gonepteryx Rhamni*, February 17th, July 25th; very common. *Leucophasia Sinapis*, May 25th; of late years rare. *Anthocharis Cardamines*, May 4th till July 7th; common. *Pieris Daplidice*, August; one in lane leading to the White Field. *P. Napi*, *P. Rapæ*, *P. Brassicæ*; all plentiful. A small variety of *P. Napi* occurs in the wood. *Hesperia Malvæ*, May 1st to 25th; common. *H. Tages*, May 9th; common. *H. Sylvanus*, June 3rd; common. *H. Comma*, July 29th; rare in wood, common on downs. *H. Linea*, July 7th; common. At sugar nine-tenths of the Noctuæ may be captured, including many good things. As for the Geometers, many local species may be found; while of the smaller moths, *Agrotera nemoralis* abounds all over the wood about the end of May. I think I have said enough to prove that Abbot's Wood will furnish a mine of entomological wealth to a diligent and systematic collector.—W. C. DALE; 3, Copthall Court, E.C., May, 1879.

CRYMODES EXULIS AND HADENA ASSIMILIS.—I have been hoping that some one having a knowledge of the habits of these supposed species would have given the Rev. T. G. Smart and others the information asked for. Since this has not been done I may now answer what I had intended at first, as somewhat supplementary to Mr. Dobree's communication in the April number. It is almost universally admitted, I think, that the species are identical, and that Doubleday's *Hadena assimilis* is but a variety of the remarkably variable *Crymodes exulis*. Henry Doubleday, in the 'Addenda et Corrigenda' to his Synonymic List says: "After *Cespitis* insert *Crymodes exulis*, Lef.," and "Strike out *Hadena assimilis* as synonymous with *Crymodes exulis*" (p. 37). This opinion was never altered, for in his collection the two specimens are still labelled *Crymodes exulis*, but are placed between *Pachetra leucophæa* and *Cerigo*

Cytherea. Newman certainly figures and describes the two species, but without Mr. Doubleday's authority for their distinctness, since *C. exulis* is unnumbered and is sunk as a synonym in the 'Exchange and Label List,' published immediately after the completion of 'British Butterflies.' Dr. Staudinger, whose authority to decide should be unquestioned, if ever he saw any British examples, since he knew the true *C. exulis* so well in its home of Iceland, also gives *H. assimilis*, Dbld., as a synonym of *H. exulis*, Lef., in his 'Catalog,' and remarks of it, "Species incredibiliter aberrans." It is placed in his division B. b. of the genus *Hadena*, which is also made to include *Furva*, *Abjecta*, *Monoglypha*, Hufn. (= *Polyodon*, L.), *Lithoxylea*, *Sublustris*, *Sordida*, Bkh. (= *Anceps*, Hb.), *Basilinea*, &c. Mr. Nicholas Cooke and others, who know our British species, hold, I believe, to its distinctness from the Northern *Exulis*, but in so variable a species habits and life-history are most important; and if anyone can contribute further to the knowledge of our British species, it is his duty to entomological science to do so.—EDWARD A. FITCH; Maldon, Essex.

EUPITHECIA TOGATA.—During the last fortnight I have bred eight specimens of *Eupithecia togata*. These were from some pupæ which I received from Perthshire in the early part of last spring. During June, 1878, I reared fourteen specimens from forty-eight pupæ, while the remainder remained in the latter state until this year. There are still twenty-six pupæ, and I shall be interested to see if any of these pass through a third winter in the pupa state.—E. G. MEEK; 56, Brompton Road, S.W.

CARABUS AURATUS, Linn., IN THE BOROUGH MARKET.—I this morning had given to me three very fine specimens (two males and one female) of the above beautiful insect. That they should be found running about the stones of a London market does at first seem somewhat remarkable, and it certainly is not a place where an entomologist would go in anticipation of finding such an insect, especially as it must be ranked among the rarest of our British *Carabi*, few instances having been recorded of its having been taken in England. I at first thought they might have found their way into this strange locality in the sacks of turnip-tops which come from the south coast at this time of the year; but upon second thoughts, I think it is more probable they have

been brought across the Channel packed in the pads of lettuce and salads which come from the South of France in large quantities in the months of April and May. This is a very common insect throughout France, where it is known by the name of *Le Jardinier*; but becomes rare as we advance northward, being seldom seen in Germany or Sweden.—T. R. BILLUPS; 4, Swiss Villas, Coplestone Road, Peckham.

Extract from *A Journey into Greece*. By GEORGE WHEELER; in company of Dr. Spon, of Lyons. In Six Books. London, 1682.*

“OUR first expedition was to climb up Mount Hymettus, whose foot is about three or four miles from Athens, south-east of it. This mountain is celebrated for the best honey in all Greece, of which it makes a great quantity to send to Constantinople, where it is much esteemed for making sorbets. They use, therefore, to bring all the honey made hereabouts, to be marked with the mark of the monastery of Cosbashi, to make it sell the better. We eat of it very freely, finding it to be very good, and were not at all incommodated with any gripings after it. This mountain was not less famous in times past for bees and admirable honey, the antients believing that bees were first bred here, and that all other bees were but colonies from this mountain; which if so, we assured ourselves, that it must be from this part of the mountain that the colonies were sent; both because the honey here made is the best, and that here they never destroy the bees. It is of a good consistence, of a fair golden colour, and the same quantity sweetens more water than the like quantity of any other doth; which they sufficiently experience in making sorbet. They wondered at my comrade, in that he preferred the white honey of France, telling him the white honey was raw, and not perfectly concocted, either by nature or the bees. Strabo, I remember, saith, the best honey of Hymettus was by the silver mines; but where they were, is now unknown, unless hereabouts, by the same reason. Now the best argument to prove that bees had their origin from hence, is, that here they never destroy or impair the stock of bees in taking away their honey, a thing which I no sooner knew, but I

* Contributed by the late Frederick Smith.—ED.

was inquisitive to understand their method in ordering the bees; which being our art so worthy the knowledge of the curious, I shall not think it beside the purpose, to relate what I saw, and was informed to that effect, by such as had skill in this place.

"The hives they keep their bees in, are made of willows, or osiers, fashioned like our common durt-baskets, wide at the top, and narrow at the bottom; and plaister'd with clay, or loam, within and without. They are set the wide end upwards, the tops being covered with broad flat sticks, are also plaistered with clay on the top; and to secure them from the weather, they cover them with a tuft of straw as we do. Along each of those sticks, the bees fasten their combs; so that a comb may be taken out whole, without the least bruising, and with the greatest ease imaginable. To increase them in spring time, that is, in March or April, until the beginning of May, they divide them; first separating the sticks, on which the combs and bees are fastened, from one another with a knife: so taking out the first combs and bees together, on each side, they put them into another basket, in the same order as they were taken out, until they have equally divided them. After this, when they are both again accommodated with sticks and plaister, they set the new basket in the place of the old one, and the old one in some new place. And all this they do in the middle of the day, at such time as the greatest part of the bees are abroad; who, at their coming home, without much difficulty, by this means divide themselves equally. This device hinders them from swarming, and flying away. In August they take out their honey; which they do in the day-time also, while they are abroad; the bees being thereby, they say, disturbed least. At which time they take out the combs laden with honey, as before; that is, beginning at each out-side, and so taking away, until they have left only such a quantity of combs in the middle, as they judge will be sufficient to maintain the bees in winter; sweeping those bees, that are on the combs they take out, into the basket again, and again covering it with new sticks and plaister. This is done without smoak; wherefore the antients call this honey—unsmoaken honey; and I believe the smoak of sulphur, which we use, takes away very much of the fragrancy of the wax; and sure I am the honey can receive neither good taste, nor good smell from it."

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[No. 194.]

VARIETY OF *POLIA NIGROCINCTA*.



POLIA NIGROCINCTA (variety).

WE are indebted to Mr. Clarence E. Fry for permission to figure this beautiful variety. It is one of some forty specimens of *Polia nigrocincta*, bred by Mr. E. G. Meek from larvæ collected in 1877 by Mr. Pankhurst in the Isle of Man, while he was jointly employed by Mr. Fry and Mr. Meek to collect Lepidoptera in that island. The larvæ were fed up in the Isle of Man, but the pupæ were transferred to London. No particular variety was observed amongst the larvæ, which were fed upon sea-pink (*Armeria maritima*), and sea-plaintain (*Plantago maritima*). The imagines of this species seldom vary either in colour or markings. Neither do the other British species in the genus *Polia*, with the exception of the north-eastern form of *Polia chi*, var. *olivacea*. The variety under notice is so unlike the original type as to be difficult to identify. The woodcut gives a general idea of the appearance.

Instead of the usual bright black and white of the superior wings, they are suffused with bright orange colour, with here and there a small patch of grey. The stigmata are strongly marked, the orbicular being filled in with bright sandy red. The usual black markings are very pale in colour; in fact dark grey. The anterior wings slightly suffused with black round the outer edge.

JOHN T. CARRINGTON.

LOCALITIES FOR BEGINNERS.

No. I.—WANSTEAD FLATS.

By JOHN T. CARRINGTON.

From time to time I am consulted by young entomologists where to go to collect insects, and especially where near London. It has frequently suggested itself to me that a series of short articles upon the localities most easily reached, and in a short time, will not only be of use to those who are now commencing the study of Entomology, but may possibly be the means of inducing others to join the army of fly-catchers. Although the whole of these may not become great entomologists in the proper sense, it cannot be doubted that it will do good in taking them from the hurry and bustle of our great city to the purer air of the fields, woods, and moors. If this series should be honoured in a perusal by the more advanced entomologist, he must remember that for him they are not written. Nevertheless, if in reading he is recalled to happy memories of *his* early collecting days, I shall have added another pleasure to my already pleasant labour. If errors from time to time creep in, I must apologise in anticipation, for my own daily occupation is such that I cannot now get so many opportunities for field work as I would wish. I shall have, therefore, to depend much on notes given by friends, and those who more intimately know the various localities.

One of the nearest localities to London is Wanstead Flats. This district is a portion of the once great forest of Epping. Though now no longer so extensive, enough remains of Epping Forest to enable the entomologist to get many a day's ramble each season. There are several ways of going to Wanstead Flats, but we need only describe two. One is by the way of Forest Gate Station on the Great Eastern Railway, to which trains leave Liverpool Street Station every half hour. On arriving at Forest Gate Station it is well to ask for the "Eagle and Child" inn, passing which the road will bring the traveller in less than half an hour to the "Flats." Another way is by train from Liverpool Street Station, as before, to Wood Street Station, Walthamstow; Wood Street is not more than six miles from London. Leaving the station turn to the left, when either road past the "Plow" inn (which is close to the station) will lead

to the "Flats." By this route the collecting ground may be reached in five or ten minutes. On arrival, Wanstead Flats will be found to consist of a mixture of pollard forest trees, under-wood, copse and swampy ground. Amongst the trees will be found oak, hornbeam, beech, a few maple, a little birch, and here and there a Scotch fir. On the Forest Gate side are avenues of lime trees; off these limes may be taken *Smerinthus tiliæ* and larvæ of *Xanthia citrago*. In other parts of the country I have found the flowers of lime trees worth working after dusk for Noctuæ. Amongst the shrub-growth at Wanstead are whitethorn, blackthorn, bramble, broom, and the little whin (*Genista anglica*). In the early season these blackthorns should be searched for *Aleucis pictaria*. During the latter part of May and early June, by brushing amongst the broom, the imago of *Chesias obliquaria* will not unfrequently flit up. By sweeping or, better still, by searching amongst the *Genistæ* in May, will be found the very pretty larvæ of *Pseudopterpna cytisaria*, nearly full grown and through its hybernation. These latter larvæ may also be beaten from the broom. While looking on the *Genista anglica* will be seen the little white cases of *Coleophora genistæcolella*. Amongst the Micro-Lepidoptera may also be taken during the season, *Psyche radiella*, *Adela viridella*, and *Harpella Geoffrella*; the latter two in abundance. Among the rarer Tortrices have been found *Ephippiphora obscurana* from amongst oak-galls gathered during winter; likewise from the same galls came *Carpocapsa splendana* and *Heusimene fimbriana*. Besides these may be found a host of interesting Tortrices and Tineina.

On the Wood Street side of the "Flats" are a large number of holly trees; on these from May to August *Lycæna argiolus* is to be found abundantly. Wanstead also produces most of our commoner Diurni; some years ago *Melitæa artemis* used to occur there, but has latterly disappeared. The blackthorns should be searched for the larvæ of *Pieris cratægi*, for at least one has been found there. *Vanessa polychloros* is not uncommon, as well as *V. Io*, *V. atalanta*, and *Pyrameis cardui*, the larva of which is abundant this year on the thistles. *Satyrus Ægeria* is not infrequent.

Those entomologists who wish to breed butterflies should bear in mind that for most species it is a waste of time to look for their larvæ during the day; but no sooner has darkness set

in than the sweeping-net will reveal scores, and many species, in May, June, and July. Unlike the imago state, the larvæ of nearly all our butterflies prefer for feeding time the darkness of night to the light of day. I remember how I used to look for the larvæ of *Erebia Blandina*; yes, for days when I was in Scotland, without finding one; but on the same ground, on trying one night with a lamp, I found them in hundreds, nearly every grass-stalk having its tenant.

On the *Epilobium* (willow herb) as well as on the bedstraw (*Galium*) will be found, in June and July, larvæ of *Chærocampa elpenor* and perhaps *C. porcellus*. *Zeuzera aesculi* and *Cossus ligniperda* are both commonly to be found setting on and about the trees bored by their larvæ. At Wanstead these species are very destructive to the trees which they affect. It is no uncommon thing to see a tree bare of its leaves and a mere wreck of its former beauty, through the ravages of these wood-boring larvæ. *Nola cucullatella* may be found, in both larval and imago states, amongst the hawthorns in June and July. *Euchelia jacobæ* is, in some years, very abundant in the larval state on ragwort (*Senecio*).

At Wanstead the geometers are numerously represented, probably more so than any other group of Lepidoptera. Amongst the best are *Selenia illunaria*, *S. illustraria*, *Pericallia syringaria*, and *Ennomos tiliaria*, from the birch; *E. angularia* and *E. erosaria*, both amongst oak. *Himera pennaria* should be looked for in October and November, with *Hybernia aurantiaria* and *H. defoliaria* at the same time. *Timandra amataria* occurs in July, not commonly. The *Clematis* (travellers' joy) should be examined, from time to time, during the summer, when the many species which feed upon it may be found. Amongst these are—*Phibalapteryx vitalbata* and *Eupithecia coronata*. *Platypteryx hamula* and *Cilix spinula* are of frequent occurrence; the former feeds on oak and birch, the latter on blackthorn. The *Noctuæ* are well represented, especially the marsh species; one of the best is *Nonagria despecta*, a fine form. *Xylocampa lithoriza* and *Xylina rhizolitha*—the former in the spring, the latter in autumn—may be found at rest on trunks of trees. While looking for these, the beginner (who has proverbial luck) might find the rare *Xylina Zinckenii*, which has as yet only been found near London, and then at rest like its neighbours in the list. On the aspens on

the Forest Gate side may be found, in June, the larvæ of *Tæniocampa populeti*, between the united leaves. At light have been taken—*Heliophobus popularis*, *Charæas graminis*, *Luperina testacea*, *L. cespitis*, *Anchocelis lunosa*. Sugar produces a large number of the Noctuæ, *Noctua neglecta* not being uncommon in some years. In the early spring months many larvæ may be found at night with a lamp, especially by sweeping the low herbage; in spring also, on the birches, will be captured imagines of *Cymatophora flavicornis*. Amongst the Pyrales have been taken *Pyralis fimbrialis* and *Endotricha flammealis* in abundance. On the duck-weed (*Lemna*) the larvæ of *Cataclysta lemnalis* feed in cases on the under side of the leaves under water. This is a very interesting larva to rear, for the aquatic larvæ of Lepidoptera in this country are not numerous. Amongst these are to be got in the ponds at Wanstead, *Paraponyx stratiotalis*, also *Hydrocampa nymphæalis* and *H. stagnalis*. The Crambites are not numerously represented in species, but those that occur are often in great abundance. These should be carefully examined, for frequently a rare species is overlooked amongst the crowd. On hawthorn sometimes may be found *Rhodophæa consociella*. The neighbourhood of bees' and wasps' nests should be examined for the honey-feeding moths, *Melia sociella* being the most frequent.

It will be seen that even so near London as to be within sound of its church bells, may be found a locality in which the entomologist may do much work; and this without let or leave, for Wanstead is open and free at all times, and the only trouble the collector is likely to get into is for actual damage to the trees and shrubs.

I think I have said enough in my first article to show that for even the hard-worked citizen there is a locality easily accessible, where he may pursue the science of Natural History, or of Botany, in comfort and without the worry of looking over his shoulder to see if "the keeper is coming." Before closing I have to thank Mr. Thomas Eedle for much information on the locality.

Royal Aquarium, London, S.W., June, 1879.

FURTHER REMARKS ON LYNDBURST.

By BERNARD LOCKYER.

UNLESS things have changed since my last exploration of the New Forest, I think visitors will not fail to be struck by the scarcity of lichen-feeding species, considering the great abundance of their food, which covers every bush and tree to such an extent that the oak woods seen from the higher ground in spring before the buds are out appear of a uniform whitish gray, almost as if frosted over, and which, on many of the bushes hangs in pendant masses of over six inches in length. The lichen-feeding Lepidoptera (the *Lithosie*, &c.) are said to be best taken as pupæ under moss on the bark of the forest trees. I was especially struck by the scarcity of *Lithosia complanula*, of which I only took one larva crawling up a trunk in Denny Wood, and two or three perfect insects (one at sugar in Park Ground); and by the entire absence of *L. mesomella* from the extensive heaths which form such a conspicuous feature in the scenery of the New Forest, the only localities where I took it, and which included one near the Clay Hill Heath entrance to Park Hill Inclosure just inside the gate, being limited and widely separated. As to *Cleora glabraria*, I have also seen it captured at rest in Park Hill Wood, and beat one or two full-fed larvæ out of oak in Pondhead in August, 1874.

With respect to butterflies I may mention that, as far as the Lyndhurst District is concerned, *Leucophasia sinapis* is of local occurrence, being confined to Park Hill Inclosure, Ramnor and Stubby Copse. It also frequents the "Manor Park," near Minstead.

Argynnis Paphia and *Limenitis Sibylla*, although generally distributed, are not abundant in every wood in the Forest; the first named being most prolific in Bignell Wood, Denny Wood, Park Ground and Pondhead, being the only *Argynnis* which breeds in the two latter, and the latter in the two last named inclosures only, especially so in Park Ground, where I have seen it attracted in some numbers by sugar.

I took a single specimen of *Arge Galathea* in Shave Green Inclosure in August, 1871. *Satyrus Egeria* usually

out-numbers *S. Megæra*, and *S. Hyperanthus* is a perfect pest. *Thecla betulæ* is very scarce, if I may judge from the fact that I only saw one larva and one imago; and *Polyommatus Phlæas* and *Lycæna Icarus* cannot be called common. *Hesperia linea* is of much more frequent occurrence than *H. sylvanus* (these two are both generally distributed, but *Syricthus alveolus* and *Thanaos Tages* are confined to Park Hill Inclosure and Stubby Copse, the latter insect being never abundant and usually scarce, the former lively little creature, generally common, occurring in little companies of three or four together.

As to the *Heterocera*, I may as well mention that *Notodonta dodonæa* and *Amphydasis prodromaria* are, like the majority of the oak-feeding species, generally distributed throughout the forest, and, together with *Cymatophora ridens* and other species, were beaten in some numbers (as larvæ) at Rhinefield, in June, 1875; where also was captured the larvæ of *Hoporina croceago*. *Saturnia carpini* is not common, and I only saw two females of *Selidosema plumaria* alive: both of these were captured on a heath west of Bignell Wood: I may note that I never saw this species settle on anything but heather; and that, although I devoted an evening to mothing for it on the race-course, I could not find a single specimen on the wing. I may, besides, call attention to a peculiar habit of the pretty little *Corycia taminata*, which frequently settles on the trunks of fir trees, where it forms a most conspicuous object at rest in the morning. It was common in Park Ground Inclosure, and I also saw it in Ramnor. *C. temerata* I never saw alive. *Tæniocampa rubricosa*, *Trachea piniperda*, and *Larentia multistrigaria* occur in the spring, but not usually in any numbers; and *Cymatophora diluta*, *Anchocelis rufina*, *Xanthia cerago*, and *X. silago* may be mentioned amongst the frequenters of sugar in the autumn; and, in conclusion, it may not be out of place to state that, of the two gaily-coloured *Euclidia* (both habitués of Park Hill and Stubby Copse), *E. glyphica* falls most often a victim to the net and pin.

FURTHER NOTES ON CERTAIN SILK-PRODUCING
BOMBYCES.

By ALFRED WAILLY.

As my notes on "Silk-producing Bombyces" (published in the 'Entomologist' for December, 1878, and January, 1879) were written very hastily through want of time, I beg of you to add the following remarks on the subject.

On page 264, fifth line, respecting the length of branches used for feeding the larvæ, the word *yards* should have been put instead of *feet*.

I now come to a most important point—the reproduction of the species in a state of confinement. From a perusal of my notes it will be seen that two species—*Attacus Pernyi* and *Samia Cynthia*—pair very readily; but with most other species pairing is the exception rather than the rule. Why should *Pernyi* and *Cynthia* pair very readily in any situation, and most other species only accidentally? In a state of nature certain species are reproduced to a far greater extent than others. When in a state of confinement the moths of exotic or even native species suffer from several causes—want of room, air, moisture, &c. With respect to native species, the cages containing the moths may be placed in the open air, and moisture may be supplied by watering the cages or placing wet sponges in them; but exotic species, if treated in the same manner, may have to suffer from another cause—the climatic difference between their native country and that of England, or any other northern country.

Hence the difficulty of obtaining fertile eggs, especially of exotic species, even supposing that male and female moths emerge simultaneously, which is not often the case unless a large number of pupæ be kept. In the middle of July I had at one time twelve fresh Atlas moths, male and female, three of which were of the giant race, yet I could not obtain a single pairing. Previously I had obtained a pairing with two of the smaller species of Atlas. With about fifty cocoons of *Pyri*, I only obtained three or four pairings.

Some persons think that if they have a few pupæ of one species they are certain to obtain fertile eggs. This is a great mistake, although the thing is not impossible. Now with

respect to the time and duration of the pairing of the species mentioned in my notes: *Promethea* moths I found to pair in the afternoon, or early in the evening; most other species very much later. The pairing of *Yama-Mai* and *Promethea* is very short; that of *Pernyi* and *Cynthia* is of very long duration; that of *Cecropia* is long also. The pairing of *Polyphemus* with some moths is very short; with others it lasts from about ten or eleven o'clock in the evening till next morning. The pairing of my Atlas moths lasted from about ten or eleven o'clock in the evening till seven o'clock P.M. of the following day. Of four pairings of *Actias Selene* two were of short duration, from about two o'clock in the morning till about five (three hours); the last two from the same time till about seven P.M. the following day. The average quantity of fertile eggs obtained from the four pairings was about the same from each female; the duration of the pairing having had no effect that I could detect upon the quality or quantity of fertile eggs; and it was the same with respect to the fertile eggs obtained from *Polyphemus*.

Another point of importance which I hope to be able to clear up this next summer—if I receive the Indian species I expect—is this:—Are the pupæ of Lepidoptera from tropical or circatropical countries affected by frost, when sent to England or any other northern country during the winter months? Does an abnormal cold cause the death of the pupa, or delay the exit of the moth, till, sometimes, the summer of the following year?

From my note on Atlas in the January number, it will be seen that the cocoons received early in 1877, which had travelled during the winter, did not produce a single moth during the summer, 1877, and that some of the pupæ died.

From a letter (sent to one of our French Consuls in British India, which I received with one from the Consul himself on January 25th, 1879) I quote the following:—"The dispatch of live cocoons to Europe is rather delicate, and requires to be done about the month of April." As far as I can judge from experience, I believe the above statement to be perfectly correct; but I think, however, that if the cocoons could be protected from any severe frost during the voyage, they would receive very little or no check at all, and it would be preferable to receive them in winter if the cocoons are to be distributed.

This last winter (1878-9) the cocoons of North American

species could not be collected for me in such large numbers as during the previous winter; but I have a number of *Cecropia*, *Polyphemus*, and *Promethea*, sufficient to enable me to obtain a large number of fertile eggs. Of *Pernyi* I have a large number of splendid cocoons. Of other species, such as *Cynthia*, *Pyri*, *Spini*, I also have a sufficient number to obtain eggs. I have also a certain number of good European species.

Before I conclude, I must say a few words respecting two Indian species (from the Himalaya) mentioned by Mr. P. H. Gosse, F.R.S., in his able and interesting memoir on the *Attacus Atlas*. These two species are *Caligula Simla* and *Attacus Roylei*; the former lives on chesnut, the latter on all species of oak. I possess cocoons of these two species, but unfortunately I discovered a short time since that all the pupæ of *Cal. Simla* were dead, and only contained dry moths. *Cal. Simla* is a double-brooded species, and very likely the moths, being unable to emerge during the last autumn (1878), in consequence, perhaps, of the great difference of climate, died in the pupæ.

The cocoons of *Attacus Roylei*, of which I possess twenty-eight, seem all in good condition; and I hope that fertile eggs will be obtained from this species, if not by me, by others who have been fortunate enough to obtain cocoons.

110, Clapham Road, London, March, 1879.

Since writing the above I may state that I kept about forty pupæ of *Endromis versicolora*, with the object of obtaining fertile eggs. Only twenty moths emerged—seventeen males and three females. The first two females did not pair; the third female did pair for a considerable time, but died without laying a single egg. *E. versicolora* moths emerged from the beginning of March till the 5th of April.

Moths of *Attacus Roylei* all emerged from the 5th till the 20th of June; seven males made their appearance first. Subsequently I obtained seven fine females, which I placed with equally fine males in seven separate cages; but I regret to say I could not observe any of the couples in coitu. *A. Roylei* is a very wild species, resembling in shape and habits *B. Yama-Mai*. The eggs are similar, but somewhat larger than those of *B. Pernyi*.

From the fact of my having been unable to detect any pairing of *A. Roylei*, it does not follow that the eggs I have obtained will

be sterile, the pairing taking place sometimes very early in the morning, as is the case with *Actias Selene*, and lasting but a very short time. I may, therefore, yet hope that many of the eggs will be fertile.

Of *Caligula Simla* I have just received twenty-four eggs, but only three larvæ have as yet hatched: these refused to eat chesnut and oak, and have died. The other eggs, which seem in good condition, will very likely hatch; if so, I intend trying other food-plants.

The long and severe winter we have had seems to have affected the pupæ of the different species of Lepidoptera I have, and has delayed the emergence of the moths for several weeks. In all probability it has caused the death of many of the early spring species, such as *Endromis versicolora*, *Agria Tau*, *Attacus Spini*, and others.

June 21, 1879.

LIFE-HISTORIES OF SAWFLIES,

Translated from the Dutch of DR. S. C. SNELLEN VAN VOLLENHOVEN,

By J. W. MAY.

(Continued from p. 151.)

CIMBEX SYLVARUM, F.

Imago: *Fabricius, Entom. System.*, 105, 4. *Panzer, Fauna Germ.*, 88, f. 16. *Fabricius, Syst. Piezat.*, p. 16, No. 3, and p. 17, No. 7 (*Tristis*). *Hartig, Blatt und Holzwespen*, p. 64. *Brischke und Zaddach, Beobachtungen*, p. 48.

Larva: *Klug., Blattwespen-Gatt. Cimbex*, p. 88 (*C. Lucorum*). *Ratzeburg, Forstinsecten*, iii., p. 134, pl. 3, f. 10 (*Lutea*). *Brischke and Zaddach, Beob.*, pl. 2, f. 1 a and b.

Cimbex nigra, parce nigro-pilosa, abdomine aut violascenti-nigro, aut rubro flavoque cingulato, alis albis aut flavescentibus pellucidis, macula sub stigmatibus et margine exteriori fuscis.

I have referred on a previous occasion to the confusion existing in the nomenclature of the larger Cimbices, so that it will not be necessary to return to that subject now. We are indebted to Brischke and Zaddach for the light which has at

length been thrown upon this matter. In this confusion the present species has only been involved as regards that variety of the male insect which is entirely black, the red-banded form having already been recognised by Fabricius as a distinct species.

I have already given a figure of the larva of *Sylvarum* (vol. v., 2nd series, page 70, pl. 4, fig. 3), only, however, for the purpose of calling attention to the points of difference between it and the larva of *Lucorum*, and without any reference to its metamorphosis. I have since received another larva from Dr. A. J. van Rossum, from which I am enabled to give a description of its metamorphosis after having had to wait a long time for the appearance of the imago. My description is, however, still imperfect, the egg and even the pupa being wanting. The first is, in all probability, deposited in a wound made by the saw of the female in the bark of a twig or petiole of the birch, and is, probably, either colourless or of a pale green tint.

I am also unacquainted with the earliest stages of the larva. Zaddach, however, informs us that its whole body is covered with a white powder, excepting in the middle of the dorsum at the place where, later, the beautiful blue dorsal line makes its appearance, the first trace of which is a little fine black line, visible after the second moult. The first of the two larvæ which I have had in my possession (it may be taken as a proof of the rarity of the species in the Netherlands that I have only been able to obtain two) was found on a birch tree near Noordwijk in the beginning of October, 1858, and from this was reared the dark-coloured male which I have figured. This larva is represented on the plate already referred to in the fifth volume, and on the present plate 3, fig. 5.

The other larva was sent to me from Enschede by Mr. van Rossum; it was among some other *Cimber* larvæ which I thought at the time must be referred to *Cimb. sorbi*, Zadd., in which, as it afterwards appeared, I was mistaken. Mr. van Rossum had mentioned to me in his letter that he sent two species, so that he had clearly distinguished the larva of *Sylvarum*. The larva received from Enschede (figs. 1 and 2) was greener and less yellow than that found at Noordwijk. Both had the usual form of the larger larvæ of this genus, resting during the day-time rolled up on the under side of a leaf, and

feeding in the evening, and probably also during the night. They feed on birch leaves, and one of them on being touched ejected a fluid from some little glands on the side of the body above the spiracles. The larvæ have a smooth round head, almost entirely white; the eyes are black, and the jaws brown at the top; the body is thick and round, but in appearance somewhat angular in consequence of the colouring on the back; the general tint is yellowish green, the yellow being more predominant about the neck, on the ventral surface, and on the last segment. The full-grown larvæ have a blue line running along the dorsum; this line is very fine at either extremity, and begins at the second segment of the body, and ends before the last, thus not extending from the head to the anus, as in *Cimbex connata* and *lutea*. On either side of this blue line the colour of the skin is yellow, either sharply defined, as in fig. 2, or gradually shading off, as in fig. 5. Each segment has seven dermal folds (see fig. 3), four of which bear small spines or prickles, very irregularly distributed. The spiracles have more or less the form of the sole of a stag's hoof, and are of a black tint (see fig. 4). The legs, which are twenty-two in number, are all white, the six thoracic legs being armed with brown claws.

I had not fed my larvæ long before they spun up, forming a very strong cocoon, almost oval in form, and consisting more of threads of a gummy secretion than of silk. The cocoon of the greener larva was pale brown, that of the other shining yellow; this latter is shown at fig. 6. In the case of the larva taken at Noordwijk, the change into the perfect insect took place within ten months; the other, however, took a longer time, and remained over the summer, appearing on the 15th of May, 1874. This circumstance, coupled with the rarity of the larva in this country, was the reason of my not opening the cocoon in order to observe the pupa, as I feared that by doing so I might interfere with the progress of the metamorphosis.

I obtained both sexes from the larva; from fig. 5 I reared fig. 7, and from figs. 1 and 2 I obtained fig. 8. Fig. 9 is drawn from an individual captured on the wing. The present species is a little smaller than the nearly-allied *Cimbex connata* and *lutea*, and is distinguished by having the back of the thorax less pubescent, and by the colour of the abdomen; moreover, the

wings have a brown stain below the stigma towards the base, and a brown or black border along the apical and posterior margins. The following is a description of the three examples figured:—

Figure 7; a male. Head, thorax, and legs, as far as the tarsi, purplish black, rather strongly punctured, and covered with erect silky black hairs. Jaws black, and palpi white. Antennæ clavate, six-jointed; the first two joints black, the third also black, but having the apex red-yellow; the remaining joints red-yellow. The tarsi are sordid yellow, having the first joint and the tip of the last, as also the claws, brownish. The scutellum is very short and broad; the cenchri brownish white. The first segment of the abdomen is deeply emarginate, the emargination being of a semicircular form, and consequently the space behind it, where the chitine is wanting, is large. The dorsal surface of the abdomen is purplish black, with a red-brown reflection on the third and fourth segments; the under-side is red, except the anal plate, which is purplish black. The upper side of the seventh segment is deeply indented in the middle. The upper wings have a purplish blue reflection in the marginal cell, which is also observable at the base of the under wings.

Fig. 8. A female, smaller and weaker. Head purplish black, with bronze cheeks. Thorax of the same black tint, the prothorax, however, bordered with sordid yellow. The first two joints of the antennæ brown, all the remainder reddish yellow. The coxæ and apophyses purplish black; the femora are of the same colour, having, however, the knees pale brown; the tibiæ and tarsi yellowish. The two anterior segments of the abdomen, the base of the third in the middle of the dorsal surface, and the eighth segment are purplish black; the remaining segments are greenish yellow, both above and underneath, having black markings between. The broad valves of the saw and the ovipositor are shining brown, and covered with short hairs. The wings are the same as in the preceding.

Fig. 9. A male taken by Mr. Ritsema in July near the water-works in the downs between Vogelenzang and Berkenrode. It was much worn, and had lost almost all its hair and the dark borders of the wings. Head and thorax purplish black; four little lines on the vertex and the posterior border of the prothorax

red. The third joint of the antennæ red, with black base (fig. 10). Abdomen, segments 3 to 6 red. The legs had all the tibiæ purplish red-brown, and the tarsi yellowish brown-red. Further, the same as fig. 7.

I have already mentioned, in my 'New Catalogue of Indigenous Hymenoptera,' that entirely black females of *Cimbex sylvarum* occur in the Netherlands, and Mr. A. A. van Bemmelen obtained such an example from a cocoon found at Driebergen. In addition to these differences in coloration Zaddach mentions two others, both in female examples. In one the abdomen, which was black, had some of its segments ornamented with two yellow spots (*C. decemmaculata*, Leach); in the other the whole insect was brownish yellow, with the exception of the dorsum of the thorax, a spot on the pectus, and the base of the abdomen. As far as I have been able to learn these varieties have not been found to occur in the Netherlands.

In conclusion I must here add from my note-book the description of a larva received on the 18th of September, 1862, from Mr. de Roo van Westmaas. It was found at Velp, in a lane of elm and beech trees, and was full grown, so that it had already begun to spin up when I received it. The size was the same as that of *C. lutea* from the willow. Head pale yellow, trophi greenish, under-lip brown. Eyes small, black, with very small shining black rings round them. Body yellowish green, yellow at the sides on the last two segments; a narrow blue dorsal line, not beginning at the head, and only proceeding as far as the eleventh segment. The sides of the body and the posterior segments closely set with white spines; spiracles oval, shining black; the excretory openings above them purple. All the legs yellowish green; claws brown. This larva did not undergo its metamorphosis. To what species can it have belonged? The description agrees very well with our species *Sylvarum*, excepting the words "spiracles oval." In addition to this the statement that it was found in an avenue formed entirely by elms and beeches does not seem to point to a species feeding exclusively on birch.

ECONOMIC ENTOMOLOGY.

By STEPHEN FITZWILLIAM.

IN the course of a conversation I recently had with the editor of the 'Entomologist,' the subject of neglected work was referred to, and I alluded to the way in which much of the practical work of the late Andrew Murray seemed to be now neglected. At the wish of the editor I write the drift of my remarks. I am not an entomologist, but I have had occasion several times to write on the practical aspects of Mr. Murray's work, and from the time of my first knowing him I gave him such help as my pen could give to forward his efforts to arrange some organisation (Government or otherwise) for checking insect damage to crops. I know how deep was his earnestness both in this endeavour and in forming the educational collection now at Bethnal Green Museum. I had frequent opportunities of discussing with him the American and continental organisations for arresting insect damage, and what should be done in this country. I was with him at the "Exposition des insectes utiles et des insectes nuisibles" in Paris in 1876, where we made full enquiries into the history of legislation in France on the subject, and I aided him subsequently in arranging the conference held at the rooms of the Society of Arts. In fact, nearly all I know on the subject of insect damage I have known from him, or from looking up records and histories in connection with him. What I have written on the subject has been on legislation with regard to it, or on the educational aspects of the question, such as the spread of a knowledge of how to recognise insect friends from insect foes, and how to deal with the latter.

In now again writing on Mr. Murray's work I still take it in its practical bearings, admitting that England perhaps possesses other men who could have done it as well; but on this point I am not qualified to judge, for, as I have said, I am not an entomologist, though I am sure none could have worked more enthusiastically. I look at the matter in this light. Here was a portion of a life's work patiently and laboriously given to carrying out an object. The collection now at Bethnal Green is a memorial of much of that work; but the point to which I especially ask attention is, what is the result of the energy which was expended in trying to

lead to practical action that should be for the good of our agriculturists and horticulturists? It is all very well to say his work remains there at the Bethnal Green Museum. That is but a part of his work,—a means to an end,—a basis perhaps for action. Visitors to the Bethnal Green Museum are not those who have the practical control of our agricultural operations. Most visitors there take an equal interest in a collection of art furniture, bulldog china, wrought-iron work, or pictures. Any addition to their knowledge is interesting, but they cannot all take action on that knowledge, and the number who would be led to take any practical steps from seeing the collection of "Economic Entomology" must be very small.

As matters stand at present the chief practical use of that collection is as a typical collection, parts of which might be reproduced in museums or schools in agricultural districts. All his efforts to secure something being actually done seem to me to have been wasted unless some one continues what he began.

In September, 1876, Mr. Murray took definite steps by memorialising the Lord President of the Council, pointing out what was done in other countries to extirpate insect foes, and suggesting that an experiment should be made to do something in England. He thought that compulsory legislation is probably premature, and at any rate could be more effectively demanded if the permissive action had been tried and failed. A central directing authority, he urged, is absolutely essential; if the experiment is to be tried let us use our best means.

He suggested that in 1877 the attempt should be made in two or three counties to begin with. Cheshire, Lancashire, and Derbyshire had suffered greatly for some years past from the onion and carrot flies. He wrote, "Let the diminution or extirpation of these flies in these counties be the first experiment. A trial to that extent would neither be troublesome nor costly, and it would to a certain extent serve as a test and guide for further proceedings. All that would be necessary would be the circulation in these counties—through the clergymen, schoolmasters, municipal authorities, and local papers—of an appeal urging every one to pull up and burn his infected plants (which are easily distinguished) on a particular day about a certain date, and to get the parochial authorities to take some trouble to see that this is done. . . . Two or three years' perseverance

in such a course should gradually diminish the numbers of the insects."

This subject was discussed at a Conference held at the Society of Arts' rooms, under the presidency of the Duke of Buccleuch. It was made known that the answer to Mr. Murray's memorial to the Lord President was that he did not see that it fell within the province of this Department to take action in the matter, and there the subject seems to have rested.

Now the practical point I would take this opportunity of bringing under the notice of entomologists is this:—Are Andrew Murray's efforts to go for nothing, or will some society keep the question to the front till something is actually done? Nothing at present is being done in the way of State action, so far as I can learn, and I have taken some trouble to get myself properly informed. Certain it is that the Science and Art Department, under whose direction he arranged the collection at Bethnal Green, is doing nothing to carry on his work, nor has anything been done by the department to take any action in the way of arranging concerted action to deal with insect damage in some such way as Mr. Murray suggested.

Perhaps it is all right that matters should be as they are; possibly insect damage in England may be overrated. It is extremely difficult to know what is the annual amount of damage done. Though the subject has received attention for nearly one hundred years, and though the amount of interest taken by all classes in our agricultural progress is great, and though we have central and local agricultural societies in abundance, we are still without organization of any kind for obtaining statistics as to losses from this cause. However, I find frequent references such as this, which I quote from the '*Gardener's Chronicle*' of 1875, p. 780:—

"The subject of insect damage is certainly occupying more of the public mind in this country now than it has perhaps ever done before. We cannot open a horticultural or agricultural periodical without stumbling upon some allusion to it, and there is scarcely a meeting of the Royal Horticultural Society's Scientific Committee at which a large portion of its time is not taken up in answering inquiries and discussing questions relating to it that have been submitted from without."

The '*Times*' of September 16th, 1876, wrote thus on the subject:—

"Our knowledge—that is, the knowledge of our men of science—is in a sufficiently advanced state to know what to do to check insect ravages. The life-history of nearly all crop pests has been worked out. The time of egg-laying, the places selected for their deposition, the habits of the larva, the condition of the chrysalis, when there is one, the life of the fully-developed insect, are all known. The most effective way of destroying the insects, selecting either the egg, larva, or chrysalis state, is also known; and much of this has been known for years. It is to be hoped that this collection will direct attention to this question—'How is it that with so much knowledge we annually suffer such great losses?' The question has been asked in America, where in many States there is a State Entomologist; and the answer has taken this form—'The individual application of the knowledge is of no good; it is useless for one property to be cleared of pests while surrounding properties still breed them. Combination is needed, and the interference of Congress can alone secure this.' Dr. Leconte, in his address before the American Association for the Advancement of Science, at the Detroit meeting, suggested that the importance of combination should be urged upon farmers, and that information as to probable benefits should be supplied to them. Bills have been introduced into Congress on the subject, but the Report for 1867 of Mr. Riley, which has just reached England, does not show more than that earnest attention is being given to the question. That Mr. Murray's hopes do not end with the arrangement of his collection as a means of usefulness is foreshadowed by a paper on insect damage he read before the Royal Horticultural Society a year ago. He wishes to see some united active steps taken for clearing whole districts at once of pests. If united action could by any means be secured, the work would be simple. A scientific inspection of a district would decide with regard to a particular pest the condition of development in which it would be on certain days. Instruction would be given as to the course to be adopted, and if this were simultaneously acted on throughout a district, the pest might be checked, if not entirely removed. It is sincerely to be hoped that either some society or the Department will take so important a matter up."

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THE WEATHER AND ITS EFFECTS ON LEPIDOPTERA.—On 1st June I captured a fine imago of *Cucullia chamomillæ* within a few yards of my house at Blackheath. The usual time of the appearance of this species in the perfect state is during the month of April and the earlier part of May, so that the specimen in question had emerged from the pupa about one month

after the usual period. I give the above as an illustration of the late appearance of Lepidoptera this year, and I think it would be very instructive if similar communications were made to the 'Entomologist,' in order that the effect on insect life of the extraordinary meteorological conditions through which we have been and still are passing may be recorded. In this neighbourhood the oak was not in leaf until beyond the middle of May, and the ash was not out till the end of that month. I saw no hawthorn in bloom until May was past. The continued bad weather has prevented most of the London entomologists from making excursions, but no doubt valuable observations have been made by those residing in the country. It is such observations that it appears to me it is so very important to record for permanent reference, and I trust that our subscribers will kindly respond to my request.—J. JENNER WEIR; 6, Haddo Villas, Blackheath, S.E., June 21, 1879.

PYRAMEIS CARDUI.—Although insects, especially Lepidoptera, are so very scarce this year, *P. cardui* is in abundance after hybernation. It has been seen in the streets of London, also in the suburbs, especially Camberwell, Hackney, Bethnal Green, and at Chingford and Sidecup, and many other places.—T. EEDLE.

A CLOUD OF BUTTERFLIES.—A strange occurrence is reported from Wetzikon, Canton Zurich. On June 14th the commune was invaded by an immense swarm of butterflies, a kilometre wide, and so long that the procession took two hours to pass. They were principally of the kind known in Switzerland as *Distelfalter*, which feed on nettles and thistles. They flew from two to ten metres above the ground, and went off in a north-westerly direction. *Distelfalter* is the common German name for *Cynthia cardui*.—J. W. SLATER.

ABUNDANCE OF INSECTS.—The 'Patriot' of Angers relates that on June 10th an immense number of butterflies were observed flying above a part of the city called Le Mail. They were travelling at a little distance from the earth, and inconveniencing persons walking in the streets. The same phenomenon was observed in Alsace, at Bisheim, on the 8th. The Bisheim butterflies were so numerous, according to the 'Journal d'Alsace,' that the light of day was obscured. Their colour was red, in places tinged with grey. Swarms of grasshoppers have recently appeared in Armenia. News from Elisabetpol states that both

the banks of the River Kur were completely covered with the insects, as far as Terter on the one bank, and as far as Akstafa on the other. All vegetation is devastated.—‘NATURE’; June 19, 1879.

COLIAS EDUSA.—On Saturday last I saw a specimen of *Colias Edusa* flying, but could not distinguish its sex. Perhaps this may be a harbinger of another “*Edusa* year.”—HOWARD VAUGHAN; June 19, 1879.

COLIAS EDUSA IN JUNE.—I am pleased to have to record the occurrence of *Colias Edusa* in June. (1) Two specimens of *C. Edusa* flew by me on Monday, June 9th, while riding on an omnibus near the Marble Arch about 1.50 p.m., flying south-west. (2) I saw two specimens on June 17th; one in the Avenue, Brondesbury, about 12.30, and the other in Cavendish Road, about 1.30. The weather was fine, and the sun very warm; flying south-west each time; S.W. wind. (3) I observed a specimen flying on the embankment of the North London Railway opposite here, about ten minutes past one on Friday, June 20th.—R. T. GIBBONS; Cecilyne, Cavendish Rd., Brondesbury, Kilburn, N.W.

ANTHOCHARIS CARDAMINES (*var.*)—On June 6, 1879, was captured, by a friend of mine, a male *A. cardamines* with the orange only on the right wing; the left wing white with the black spot, and dark on the edge. This is, I believe, of unusual occurrence.—WILLIAM DEAN; Epping.

BUTTERFLY LARVÆ.—I have latterly been collecting some butterfly larvæ for the purpose of preservation. I have found little difficulty in obtaining several of the commoner species, and have now feeding in my cages the following:—*Satyrus Janira*, *Chortobius Pamphilus*, *Lycæna Alexis*, *L. Corydon*, and *L. Adonis*.—T. EEDLE; 40, Goldsmith Row, Hackney Road, E.

ACRONYCTA ALNI NEAR NOTTINGHAM.—The larvæ of the rare *Acronycta alni* which Mr. Watchorn, of 30, Mount Street, found at Cotgrave on August last, came out on Tuesday, June 3rd, a perfect imago, and was exhibited at this society’s room on Monday, June 9.—J. BROOKES, Hon. Sec.; Nottingham Working Mens’ Naturalist Society.

LAPHYGMA EXIGUA IN THE ISLE OF PORTLAND.—On the 6th of June, 1879, I obtained two examples (as fine as bred) of this rare moth, near the Chesil Beach, at Portland. This is its first recorded occurrence, I believe, in the county of Dorset.—O. P. CAMBRIDGE; Bloxworth, Dorset, June 18, 1879.

LAPHYGMA EXIGUA.—Last evening two young gentlemen of this town, who are making a collection of Lepidoptera, brought me a few of their recent captures to name for them, and among these was a very fair specimen of *Laphygma exigua* (female), taken at light on the evening of the 17th instant. They also informed me that they have another on their setting-board at home, taken on the 18th. I think this is worthy of record in the 'Entomologist,' as *L. exigua* is undoubtedly one of the rarest of our Noctue. At all events I can vouch for its rare occurrence here; having carefully worked this locality for the last fifteen years, I have never seen a single specimen.—W. McRAE; Westbourne House, Bournemouth, June 28, 1879.

LAPHYGMA EXIGUA, DEILEPHILA LINEATA, &C., AT TORQUAY.—On the 11th inst., at Torquay, I captured, at dusk, a fine *Deilephila lineata*, male, at the flowers of *Silene maritima*, and on the following evening I took, on the wing, a *Laphygma exigua*, female. On the 20th inst. I secured, in a clover-field, flying in the bright sunshine, a fine *Heliothis armigera*, female.—A. H. JONES; Eltham, Kent, June 20, 1879.

OCCURRENCE OF EPHIPPIPHORA RAVULANA.—While collecting in Tilgate Forest, on the 12th June, I captured a single female specimen of this rarity when on the wing. Curiously enough my capture was made within a yard or two of the spot where I took a former specimen, also a female, a few seasons ago.—WALTER P. WESTON; 1, Duncan Terrace.

NOTES ON THE SEASON.—At the time I write from this moorland district it is still bitterly cold. *Hybernia progemmaria* and *Diurnea fagella* are still out. I took the same species in the first week in April. During the first week in May I took over fifty *Peronea mixtana* by smoking them out, and at the same time a green hairstreak (*Thecla rubi*) flitted out. A solitary *Fidonia atomaria* ventured forth. When coming here on Friday evening I saw a moth quite new to me; it was about six o'clock and bitterly cold. Its flight was much like that of the emperor moth, but the colour was of a lilac-brown. The man who was with me said he had been after one for some weeks, and my wife had noticed either the same insect or one similar. I have wondered whether they could be *Lasioampa ilicifolia*. When looking for larvæ of *Gelechia tricolorella* on the stitchwort (*Stellaria holostea*), I found a large

larva of a *Plusia*, which I hope to be *P. bractea*. I used to take it frequently here some thirty years ago; it was feeding upon dog mercury. I have taken a description and made a sketch of it, and afterwards found two other tenements that had been deserted on the same plant by a *Plusia* larva.—J. B. HODGKINSON, Dutton, Ribchester, Lancashire, May 26, 1879.

OCCURRENCE OF THE LARVA OF NEMOTOIS SCHIFFERMILLERIELLA.—I have much pleasure in being able to record the capture, on April 24th, of the larva of *Nemotois Schiffermilleriella* in the vicinity of Gravesend—a larva, I believe, hitherto not observed in Britain, although the imagos are taken in one or two localities every year. For the last two seasons I have looked in vain for the larva in a locality where for some years past I have taken the perfect insect, but this year, I am happy to say, I found about twenty-seven cases. Since I have had the larvæ feeding I can now quite understand the reason of my failing to discover the larva before. I had always searched the upper leaves of its food-plant (*Ballota nigra*), thinking they were attached to them, but I find on observing those I have in the glass jar that when the food is touched, be it ever so slightly, they draw themselves into their cases and drop to the ground, so that the surface of the ground round the food-plant is the place to look for them. It was by the merest accident I found the first case; I had been searching as usual the upper leaves of the plant for about two hours, but could not find any case, when I suddenly thought I had better examine the radical leaves, thinking they were on them. Almost the first leaf I turned over I saw a case on the ground. I then set to work with a will, but as it was getting dark I could only find six cases. On a subsequent visit I found twenty-one more with larvæ in them, and several empty ones, no doubt last year's cases. The cases are flat, of an oblong oval form, open at each end, and drawn in at the centre, very much like the figure of eight, and with the single exception of my cases and larvæ being larger (quite six or seven lines in length) they agree in every particular with the very excellent description in the 'Natural History of the Tineina,' vol. xiii, p. 214. Of some cases I sent to Mr. Stainton, he writes that although he had never seen British larvæ before, and they are certainly larger than those he received from Frankfort eighteen years ago, he has no doubt they will

prove the same species, both from the food-plant and from my having taken the insect in the same locality. I have also observed in the larvæ that if they are touched when crawling they immediately draw themselves into their cases, and after a time appear at the other end and crawl away in an opposite direction. The cases appear to be constructed in two pieces or *halves*, as it were, merely fastened together in the centre where constricted, and which acts like a hinge, so that when the larva protrudes itself from one end it causes the other end of the case to become securely closed—a very wise provision against all marauding intruders.—GEO. ELISHA; 122, Shepherdess Walk, City Road, N.

COLLECTION OF ECONOMIC ENTOMOLOGY.—A valuable "Collection illustrating the Injuries to Garden and Field Crops, Pasture Lands, Timber Trees, and Grains, resulting from the attacks of destructive British Insects, exhibited by W. S. M. D'Urban and the Misses E. A. and G. Ormerod," was recently exhibited at the Exeter meeting of the Bath and West of England Agricultural Society. This has been established through the labours of Mr. W. S. M. D'Urban and the Misses E. A. and G. Ormerod. It is somewhat after the type of the instructive but incomplete collection in the Bethnal Green Museum; the arrangement, however, is different, for here the more natural grouping of the insects injurious to certain allied plants, crops, or productions is followed, entomological classification being altogether ignored. The collection is intended to be thoroughly practical in its teaching, and is well illustrated with specimens of insect ravages, or, where these are difficult of preservation, by beautiful models or illustrative vignettes. Although only commenced last autumn it is already well spoken of, but help is asked for its future development; this, doubtless, will be forthcoming, and when located in its permanent resting-place of the Devon and Exeter Albert Memorial Museum it will form a fitting type of what ought to be in every local museum in the kingdom. Bethnal Green is dormant, possibly Exeter will outrun it.—E. A. F.

ENTOMOLOGICAL PINE.—We have received a sample-card of the entomological pins, gilt and plain, made by Messrs. D. and F. Tayler and Co., of Birmingham. We have pleasure in bringing them under the notice of our readers, although the well-known excellence of these pins is a sufficient recommendation.—ED.

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VARIETIES OF *LYCÆNA AGESTIS*.



Fig. 1.



Fig. 2.

THE extraordinary variety, figured above as No. 1, is from my collection, and was captured by me last season. The ground colour of the under side of all four wings is of a pearly white colour, while the row of red spots along the margins of the wings is very bright and distinct. Except the central spot on each front wing, and two others near the upper margin of the lower wings, the normal black spots are entirely absent.

The other striking variety, No. 2, while approaching the preceding in the silvery ground colour of the under side of the wings, affords a beautiful contrast in markings. The black spots on the fore wings are prolonged into streaks, of which the first upper ones are more decided, the lower ones having a smoky appearance. There are two very clear streaks on the upper margin of the lower wings, which are also sprinkled with small irregular spots. This specimen was taken by Mr. William B. Farr, of Maidenhead, last season, in Surrey, and kindly presented by him to Mr. Carrington.

WALTER P. WESTON.

THE TORTRICES OF SURREY, KENT, AND SUSSEX.

By WALTER P. WESTON.

THE south-eastern corner of England, either from its proximity to the metropolis or on account of its being easier of access than more distant localities, is, I think, more extensively worked by entomologists than any other district of equal extent; and though the lists of rarities and of species occurring in these counties are very long, still much more remains to be done before we can claim to have exhausted their entomological fauna. There are extensive districts that have never been worked, except in the most casual way, which would well repay the collector who was bold enough to search out a fresh locality for himself instead of visiting the same places and taking the same insects season after season. But to do this completely would require a long sojourn, or at least constant visits, as it is only by continual working for several years that one is able to form anything approaching a tolerably complete idea of the different species occurring in any locality.

Amongst the entomologists who devote their attention to these counties a very large proportion are exclusively Macrolepidopterists, who, from want of time or inclination, pass over the groups of smaller insects entirely without notice. I have frequently been informed by beginners and others that this is due in a great measure to the difficulties of setting and nomenclature, though perhaps the latter would apply more to the group under our present notice, as there is no complete work on the Tortrices that can in any way compare with Mr. Stainton's careful treatise on the *Tineina*. For although Mr. Wilkinson's work and Mr. C. G. Barrett's "*Notes on the Tortrices*" are of the greatest use to the student, yet the former is sadly in need of a supplement to carry its information down to the present time; and the latter, from the broken form in which they have appeared, are not so easily available as to be of much assistance to the beginner.

In the hope of inducing some of my readers to devote more attention to this most interesting and by no means difficult group, I have endeavoured to make out a list of the species occurring in these counties, which are exceedingly rich, a very large proportion of our total number of species occurring in them.

Besides the district lists from Folkestone, Hastings, and Reigate, I have been obliged to depend entirely upon the kindness of friends and my own notes for the information contained in the following list. I have made it as complete as possible; still it presents a somewhat meagre appearance, especially in the number of localities in which the various species of insects are known to occur.

In making a collection of Tortrices—and it will be extremely difficult, if not impossible, for anyone to become thoroughly acquainted with this group of insects without a collection at hand for constant reference—the chief difficulties to be encountered are the tendency of some of the species to “spring” after being set, and of others to succumb to the gradual production of verdigris. To avoid the former evil the Tortrix collector must, with the majority of specimens, entirely dispense with the damping box, which almost invariably causes the wings of the specimens left in it to close over the back, like those of a butterfly at rest. When they have once assumed that position it is scarcely possible to set them with any certainty of their permanently retaining the desired form. During the first spell of damp weather their wings frequently show a tendency for the upward movement just described, until in a short time the cabinet series exhibits a complete variety of attitudes by no means pleasing to the eye, and as opposed as possible to all ideas of symmetry. With very few exceptions, such as *Phtheocroa rugosana* and some of the *Eupæciliæ*, Tortrices may safely be carried home in pill-boxes, unless the size chosen is too small, without danger of their damaging themselves; but it is never advisable to put more than one specimen into each box. The smaller sizes of the glass-bottomed boxes are most handy, for they enable a closer view to be taken of an insect than is possible in the net, and also facilitate the rejection of worn and damaged examples, two advantages which are not to be despised at any time, and are especially useful on fortunate expeditions. I need hardly remind my readers that, when captured, all Micro-Lepidoptera should be kept in the dark and as cool as possible until they are killed.

Some groups of Tortrices are more subject than others to the attacks of verdigris, to which those whose larvæ are feeders upon pith of plants are particularly liable. I may specially mention as instances of this the *Dicroramphæ* and several of the *Ephippiphoræ*

and *Euprecilia*. Mr. Meek has introduced enamelled pins impervious to verdigris, but they have hardly been in use long enough for their true value to be estimated.

There are several methods of killing Tortrices, some of which are preferable to others, for they do not stiffen the specimens after death: of these liquid ammonia is most to be recommended; by this agent several insects can be killed at the same time by a few drops of the fluid. The boxes containing the specimens to be killed, having been opened a little on one side to admit the fumes, should be placed in a large basin or box (a high hat is often handy) with a few drops of the liquid on a sponge or piece of wadding, and the whole covered over with a towel or cloth. In little over half an hour the insects will be ready for setting. The great drawback, however, to the use of ammonia, is that the fumes hang about the boxes so that they cannot be used for other captures immediately afterwards, but require to be left open for an hour or two to air. Chloroform, on the other hand, is free from this objection, but is very apt, unless with careful handling, to render the specimens rigid and difficult to set. I have, however, used it for several years, and consider it preferable to all other poisons. A strip of blotting-paper dipped in the chloroform is inserted in the pill-box containing the insect to be killed, which in a few seconds may be set, and the blotting-paper is free for another victim; and so on, taking care never to kill more than one or two specimens at a time, and to set each specimen as soon after death as possible, and before *rigor mortis* has had time to set in.

From these few hints, which I trust may be of service to those about to commence the study of the Tortrices, I will next month pass on to the list of the species occurring in the south-eastern counties.

I, Duncan Terrace, N.

LOCALITIES FOR BEGINNERS.

No. II.—RIDDLESOWNS.

By JOHN T. CARRINGTON.

I KNOW few greater luxuries than an afternoon stroll over the breezy Surrey downs when one suddenly alights from the train, after a short ride of some forty minutes from the hot and crowded

London streets. There is no pleasanter than Riddlesdown, which is quite a typical chalk down. It is covered with short, turfy grass, which is thickly intermixed with flowering plants, while in many parts are abundant groups of juniper bushes. These bushes are rarely so thick as to interfere with the collector, and are a fruitful source of entomological wealth.

Arrived at either Charing Cross, Cannon Street, or London Bridge Stations, the student may choose one of about a dozen trains daily, and book his return ticket for half-a-crown to Kenley Station. Arrived at Kenley he is positively on the ground, for to his right on leaving the station he sees the Down in front of him. Another way, and one I always prefer when in no hurry, is by East or New Croydon Stations. I use one of these rather than West Croydon, and so save a walk through the not very interesting town. On leaving either of these stations, which are side by side, ask for the Brighton road, and follow it south until you come to the lane leading to Riddlesdown. There used to, and may still, be a friendly post, on which you read that there is a pretty walk across the Down, an unusual addition to the common guide-post. Until this point is reached, which is about a mile and a half from the station, there is little of entomological interest. The road now leads under a railway arch, leaving to the left the celebrated Purley oaks, where much collecting was done in the last generation. From that point collecting is good right up to Riddlesdown proper. In this lane, which has fine rough hedges on each side, I have frequently had a good evening's sport. It is a good locality for Tortrices; and on some evenings Geometers are in such abundance as to puzzle even a smart collector. In fact a much greater variety of moths will be found in this lane than on the Downs farther on.

The hedges contain a good variety of shrubs, such as hawthorn (*Cratægus oxyacantha*), mountain ash (*Pyrus aucuparia*), wild service tree (*Pyrus torminalis*), several roses and blackberries, broom, guelder rose (*Viburnum opulus*), hazel, sallow, spindle tree (*Euonymus europæus*), and several others. Over these trail magnificent masses of traveller's joy (*Clematis vitalba*), and here and there the beautiful bryony (*Bryonia dioica*), with its fine vine-like leaves and red berries in autumn.

In this lane the young collector may take several butterflies which are well worth looking after. *Gonepteryx rhamni*, *Satyrus Megæra*, *S. Semele* and *S. Tithonus*, *Polyommatus Phlæas*, which

should be examined for varieties, as should all the blues, several of which occur both here and farther on the Downs; for instance, *Lycæna Agestis*, *L. Adonis*, *L. Corydon*, with *L. Argiolus*, on some hollies in the hedge enclosing the Downs to the right of Kenley Station. *Pieris Daphidice* has been taken either in the lane or on the Downs.

Geometers may be disturbed from the hedges during the day-time with the beating-stick; but in the dusk of evening they are, as I have already said, common enough. Amongst them are to be found *Selenia illunaria* and *S. illustraria* in early spring, or during their summer brood; *Hemithea thymiaria*, *Acidalia ornata*, several *Eupithecia*, *Melanthia ocellata*, *Melanippe procellata*, *Anticlea rubidata*, *Phibalapteryx vitalbata*, *Scotosia vetulata*, and *S. rhamnata*. As for Tortrices and Tineina their name is legion.

Even of such nice species, as are many of those just mentioned, one gets tired in time, and strolls forward on to the open Downs. The road we have just come along crosses the top of Riddlesdown. Following it for a few hundred yards we find to the left a small wood of mixed trees, but chiefly oak, with a very thick undergrowth of hazel, &c. I have frequently worked in this wood, but seldom got much in it to repay the time spent there. It seems too thick, if the undergrowth has not since been cut.

On the right of the road is the open Down, sloping with southerly aspect to the bottom of the valley, along which runs the Caterham high-road past Kenley Station. On this Down the juniper (*Juniperus communis*) is the most striking object: these bushes, about two to five feet high, should at all periods of the year be worked; several species of Lepidoptera are peculiar to them. In October and November, when most other species have "gone to their rest," *Thera juniperata* often occurs in great abundance. Little else is to be then taken, and these best by night when flitting on the lee sides of the bushes. I always think it melancholy work when taking this species: it is the end of the season, and then in the darkness of night the junipers are weird and sombre-looking, especially when the wind sighs so sadly through them. Much more lively work, although you seldom make such a big bag of boxes filled with one species, is in August, when we should hunt for the scarce and local *Chrosia ratilana*. The imagines of this species are occasionally to be disturbed by day when beating the bushes, or by smoking the

ground under the lower branches ; but great care should be taken not to fire the bushes, unless one is a candidate for one's name appearing in the police column of the newspapers. I have rarely heard of large bags of this species being made, but I once got about three dozen on one afternoon. While looking for *Rutilana* I have frequently disturbed fine specimens of *Cerigo cytherea*, and these chiefly females. I never remember taking females at sugar ; they are therefore often wanted by correspondents. One of the commonest moths from these junipers at the same time is *Eupithecia sobrinata*, which are at Riddlesdown sometimes especially fine and well marked. At the farther end of the Downs from Croydon are a few stunted yew trees (*Taxus baccata*) ; these are worth overhauling, for from them I have often got moths I wanted ; I have found *Lithosia deplana* in them when beating the branches.

Amongst the grass on the open Downs we find most of the usual chalk-down plants, as well as wild thyme (*Thymus serpyllum*) in abundance, several vetches (*Viciæ*), bird's-foot trefoil (*Lotus corniculatus*), wild mignonette (*Reseda lutea*), hound's-tongue (*Cynoglossum officinale*), devil's-bit and field scabious (*Scabiosa succisa* and *Knautia arvensis*), &c. By looking under the shady bushes may be sometimes found orchids of some rarity and of exquisite beauty, *Orchis purpurea* being one of these.

By sweeping the ground gently on fine afternoons throughout the summer, many good and some rare Micro-Lepidoptera may be taken. One of the species for which Riddlesdown is noted is *Eriopsela fractifasciana*, which occurs in early spring and again in August. Of the genus *Phycis* occurs *Adornatella* and its nearly the beautiful *Ilithyia carnella*. *Crambus geniculellus* and *C. inquinatellus*, the latter frequently, the former commonly. Among the Pyralides, which are particularly well represented, are *Pyrausta purpuralis* and *P. punicealis*, while *Herbula cespitalis* is very abundant ; and probably others of greater rarity, if carefully worked for. In fact, I should often remind my readers how necessary it is to box everything about which there is the slightest doubt, for further examination. How frequently does a rarity get overlooked in mistake for something common. As I said in my last article, beginners have proverbial luck ; but I have no doubt this is to be solely attributed to the fact that, wanting almost

everything, they box all before them. On a fine sunny afternoon in July or early August the whole herbage literally swarms with Tortrices and Tineina. *Sericoris cespitana* is common; *Euchromia purpurana* rare at times; while *Phoxopteryx comptana* is, as on all chalk downs, in countless thousands.

Feeling tired of the Downs the entomologist may wander down to a large chalk quarry at the end farthest from Croydon. Here he will find *Lycæna Corydon* commonly, besides other species, to repay a visit. There is another old quarry at the end of the road from the Downs, where it joins the Caterham Road. Here is a more varied growth with plenty of viper's bugloss (*Echium vulgare*), with its pretty groups of bright blue flowers; also some fine plants of mullein (*Verbascum*), I forget of which species. On these I once found a batch of shark larvæ (*Cucullia verbasci*); but while I was making a fine haul of them an irate publican, from the public-house opposite, ignominiously turned me out. That is the only time I have been interfered with on or near Riddlesdown, where I have no doubt on nearly every occasion the collector may work away in peace. I am not aware whether there is any right to wander or no over these Downs, but I have never been otherwise questioned.

There are some good-looking meadows at the bottom of the valley. Never having worked them I cannot say much about them, but I have heard that sometimes *Acontia luctuosa* is to be taken—by the collector who can run—flying over the clover fields. All the valley seems good up towards Caterham. There are other Downs in the neighbourhood, on one of which, Purley Down, the junipers are larger and older, some ten or more feet high, but I have always done better on Riddlesdown with much the same fauna. Purley Down is to be reached by turning to the left from the Riddlesdown lane soon after leaving the Brighton Road. Passing also under a railway arch through the old Purley oaks, straight on until an unfinished and abandoned railway cutting is reached, when Purley Down will be seen on the right. I understand this is more strictly preserved, and the collector may be asked to leave sometimes.

I have never sugared on Riddlesdown, or in its neighbourhood, but it would be well worth trying. A train leaves Kenley just after 10 o'clock p.m., but trains from West Croydon to London may be got up to midnight, or nearly so.

Riddlesdown is, for the Lepidopterist, one of the nearest collecting grounds to London where may be obtained the chalk-hill species. It is perhaps not quite so good a ground as some others I hope at another time to refer to, but for all ordinary chalk species it is sufficiently good; besides the lanes and hedges in its neighbourhood providing many and some rare moths. When I resided at Norwood, in 1876, I gave it many trials, and never came home with empty pockets.

Royal Aquarium, Westminster, July, 1879.

UNDESCRIBED OAK-GALLS.

By E. A. ORMEROD, F.M.S.



THE accompanying sketches are of two apparently undescribed species of oak-galls: one, the bud-gall, is very plentiful in the neighbourhood of Isleworth; the other was gathered near Maldon.

The bud-gall (which is figured both natural size and magnified) much resembles a stunted form of that of *Aphilothrix collaris*, but is much smaller, and remains to maturity buried in the bud scales. I have found it rather numerous in winter and spring; but as it does not make the slightest show externally, and the buds in which it is contained are not distinguishable from the others, I have only come on it accidentally during search for possible winter developments of details of gall-growth, and the gall-maker has been too much crushed to rear for definition. It

is somewhat oval in shape, single-chambered, with a thin crisp wall; and, from the various conditions in which I have found it, appears to form (accompanying the growth of its larval tenant) during the latter part of winter and beginning of spring, the imago quitting it before the season of expansion of the healthy buds. I conjecture that this very minute gall is much sought after by birds, as in the seasons when I have found most of it I have noticed the buds frequently torn open; and there is no other bud-gall common in the district at that time, as far as I am aware. Possibly some other observer may be able to add the name of the gall-maker.

The other gall figured is very unusual in appearance, and has caused such complete distortion of all the surrounding growths as to make it difficult to convey with the pencil any characteristic forms. As seen magnified it much resembles an abnormal form of *Andricus inflator*. It, however, consists of two oval cells; these are rather thin-walled, placed side by side, and occupying the entire width, and about two-thirds of the length of the irregular hollow chamber formed by the swollen base of the stem in which they are contained, the outer walls of the gall cells and the inner walls of the gall chamber being adnate for (approximately) half the cell surface. The gall cells are not quite an eighth of an inch in length, and were deserted when I found the specimen, the only one which I have seen of this kind, and differing so much from any normal state of bud-gall with which I am acquainted that possibly a figure may be of some interest.

Spring Grove, Isleworth, July 5, 1879.

PEA ENEMIES.

By EDWARD A. FITCH.

DURING this ungenial spring—I might almost say protracted winter—our garden and field crops have suffered severely, since growth has been almost impossible, and the plant has been altogether unable to withstand attack from insect or other enemies. Our pea crops are among the greatest sufferers, and the true nature of the attack is almost universally overlooked. Almost everybody, who has attempted the out-door growth of early peas this year, has been disappointed; in most cases they

are altogether a failure, and few indeed are the gardens in which autumn- or winter-sown peas look really well. The seed germinated kindly, and there was a good early plant. The severe winter weather possibly had its effect, but the great mischief on our garden rows and in general field culture has been wrought since February or March. First the leaves were eaten and notched, and finally the whole plant disappeared.

The most careless observers blamed the ungenial weather; then came those who looked amongst the smaller mammals, as mice or rabbits, for their enemies, but nine out of every ten gardeners, I believe, blamed the much-maligned sparrows. Garden netting and wire pea-guards were brought into requisition, but the peas continued to waste as fast as ever; nor did the tile mouse-traps or the feather stringing avail anything.

The result of these attacks is seen everywhere, for many thousands of yards of pea rows in our gardens have been dug up as useless, and some hundreds of acres in field culture have been ploughed up. The effect is patent, the cause is latent. Where, however, the careful observer took his lantern and examined his gradually diminishing pea-plant after dark, he probably would meet with his numerous, but tiny, enemies in the shape of an insect (*Sitones*), a myriopod (*Polydesmus*), and a crustacean (*Oniscus*); thus would he become satisfied that it was not the slugs, and see why his lime and ashes had not the desired renovating effect.

These destructives have all been especially busy this spring, and with most disastrous results on our green pea crops. The little beetles (*Sitones lineatus*) will be at once recognised when found; but here is the difficulty, as from their general habit of falling to the ground when alarmed they may very easily be overlooked by a casual observer, since their colour and shape is almost a perfect match with the particles of soil amongst which they feign death for a short time. A quick eye, however, they will not escape, and just now pairs of *Sitones* are especially common sitting on the dilapidated pea plants, *in cop.*; they may readily be collected in almost any weather, though they are not above seeking shelter on a rough or inclement evening. In one year (1836) Mr. John Walton collected and set upwards of one hundred pairs so taken, and their display, not unnaturally, excited the risibility of the illustrious Curtis. These were used

for specific determination, but here I especially call attention to the pairing, since the life-history of these very abundant weevils is still unknown. It is not difficult to procure eggs, but further than that I believe no one has succeeded. The knowledge of the economy of *Sitones* is not only entomologically important, but is of great utilitarian interest, since very little can be done to destroy the hardy, hybernating, insignificant beetle itself; in its earlier stages it may be less capable of resisting attack.

The well-known and omnivorous woodlice (*Oniscus asellus*) are readily discovered at their evening meals. It is not always they are so destructive to our pea crops, but this year they have, I know from actual experience, destroyed much. The young succulent early peas, where grown near their haunts, was almost the only living vegetable growth to which they could resort. Unfavourable as the seasons have been for plant life they appear to have had quite a contrary effect on the isopods, for I never remember woodlice more abundant.

This latter remark equally applies to that destructive little myriopod, *Polydesmus complanatus*. Several evenings lately I should have had no difficulty in collecting these young creatures by the hundred, and this without traversing much ground and in a comparatively short time; they were so abundant. In many cases I found three, four, and even five on one pea; they were, however, much quicker in getting out of the way than the fat woodlice, and appeared more impatient of light. These light-coloured, almost white, centipede-like creatures may be at once recognised by their deeply cleft segments, each of which bears two legs on each side; they are especially fragile even when living, but when dead and dry they can scarcely be touched without breaking.

These are all contemporaneous destructives to the young peas, and, as I have said, an immense breadth of crop has been already sacrificed. Late sowings and half-plants are now the basis on which the general white and blue pea crop of 1879 rests, and, speaking agriculturally, I must say that to all present appearance this is likely to be a very precarious one. The "louse" (*Aphides*) only needs to be mentioned to be at once dreaded by all farmers; and this year, where the pea growth is so backward and so weakly, it is especially liable to attack. This is a gloomy prospect, so I

will not pursue the subject; should, however, the surmise be correct, as I greatly fear, the 'Entomologist' will contain a further note. I will not meet evils half way in these bad times.

Maldon, Essex, May, 1879.

ECONOMIC ENTOMOLOGY.

By STEPHEN FITZWILLIAM.

(Continued from p. 179.)

Not only the 'Times' of this and other dates, but the 'Morning Post' and other daily papers, might be quoted as showing that Mr. Murray's suggestions had attracted popular attention. Scientific papers and periodicals took the subject up, and as a matter of course it was discussed in journals specially devoted to agriculture and horticulture. Since the conference of June 5th, 1877, however, nothing whatever has been done—nothing towards the further discussion of the subject, and nothing towards keeping the matter under the consideration of the Government. Two years have been wasted.

I have received some information, since the appearance of the first part of these notes, about the collection of Economic Entomology made for the Devon and Exeter Albert Museum by the Misses Ormerod and Mr. D'Urban, to which I hope to refer later on; but at present I wish to keep under the consideration of entomologists the question whether Andrew Murray's efforts to arrange concerted action against our insect foes should be allowed to pass into oblivion or not.

As I said above, perhaps insect damage in England may be overrated. Possibly Mr. Murray may have overrated it when he urged upon the Privy Council that it was a matter requiring their intervention in some way to direct combined action. The fact that the press spoke at the time of the importance of the subject does not prove much, because the writers had no statistics to go upon. Can any one furnish a statement based upon calculation—not opinion, but calculation, however rough—as to the annual losses to the agriculture of our country from insect damage? In the 'Morning Post' of April 5th, 1877, it was said that a rough estimate had been made that the annual losses equalled the cost of the Abyssinian war. It seems that what we especially want

is a trustworthy account of what our losses actually are. If combined action is needed to meet an evil, the first thing to be done is to prove that the evil really does exist to an extent that makes combined action worth the trouble of organizing. Now it is strange, with all our Societies—Agricultural, Entomological, Horticultural, Natural History, Statistical, and others—that not one of them has taken up the systematic collection of facts with regard to insect losses. It might possibly be not very easy to give the losses as expressed in money value, but they might be expressed in acres for crops so damaged as to be not worth gathering, and by weight or measure for those gathered. As none of the existing Societies have done it, it is perhaps worth considering whether it might not be well to organize a Society for this purpose, which might also discuss insect damage and remedies generally.

When we look at the success which has attended Mr. Symons' efforts to get returns of daily rainfall, and remember that he now has 2000 regular observers in the country, and that their record has to be a daily one, it seems hardly too much to expect that well-directed and sustained energy might secure the regular return of statistics of any kind, if it could be shown they were of practical use. It is just possible that there may be difficulties in the way of doing this which have not occurred to me, such as the reluctance of farmers and market gardeners to let their losses be known. If those most familiar with the ways of farmers, market gardeners, &c., see any reason for believing that trustworthy returns of damage could not be obtained, it would be as well that such should be made well known, as then it would be clear we must give up expecting statistics, unless they could be obtained from inspectors appointed to obtain information from their own observations. So far, however, as I know, there would be no more difficulty in obtaining reports of losses by insects than reports of the first appearance of certain flowers or birds, such as we now regularly have. If it is urged that the collection of statistics is rather work for a Government than for a Society, I would ask, in that case, why are not entomologists taking steps to keep the matter under the notice of the Government? Perhaps it is not considered to be a strictly entomological matter. In that case, is it then for Agricultural Societies to keep an eye on the matter, and to memorialize a Government department?

The fact I now am considering is that Andrew Murray seemed

to be very nearly getting some initiative step taken, and that since his death nothing is being done. If what he attempted was on the wrong lines, it would be well if some one duly qualified to do so would point out where it was wrong. If it was on the right lines, is there not any one to be found, or is there not a Society to be found, to continue the work he commenced?

If the statement is anything like an approximately correct one that our annual losses by insect damage are equal to the cost of an Abyssinian war, the matter is far too serious to be ignored. If this is quite wrong it ought to be corrected. No doubt, in thinking of estimates of our losses, the mind is unconsciously influenced by the statistics of American losses. We may feel assured that these statistics show losses far in excess of what we suffer in England; but in the absence of any statistics of our own we cannot help wondering how our own would come out in figures, and being influenced by American figures. It is perhaps hardly fair to allude to American losses from the "Rocky Mountain locust," as we have nothing of the kind in this country; but when we learn from the first Report of the United States Entomological Commission that the losses from the locust ravages during the years 1874—1877 amounted to 200,000,000 dollars (fifty million pounds nearly), we cannot help speculating as to what kind of proportion our losses bear to this. No wonder that Americans have had recourse to legislation for the destruction of locusts!

But though we have no statistics as to the losses we sustain, it seems to have been often recognised that they are of sufficient magnitude to be worth the attention of the Government, for the purpose that they in some way should direct action. In considering what should be submitted to our Government for them to undertake, it is instructive to look at what other nations have done.

Let us first take France. An official abstract of French legislation on the subject is fortunately ready to hand. The 'Journal Officiel' for June 28th, 1876, in giving the *proposition de loi* relative to the *projet de loi* drawn up and presented by MM. de la Sicotière, Grivart, and the Comte de Bouillé, had fourteen columns occupied with the history of legislation. It does not go back farther than the earliest civil war of 1732, but those who have read Boissieu's 'L'Entomologie Horticole' will remember his reference to ecclesiastical fulminations against

insect depredators, where he cites two old records, one of 1120 and another 1516, which show that caterpillars and cockchafers were ordered to take themselves off within six days under pain of excommunication. The earliest attempt at legislation referred to in the 'Journal Officiel' is the law of 1732, which ordered farmers and landowners to destroy caterpillars, the fine for neglect being 50 livres. This law of 1732 was renewed by prescriptions in 1777 and 1787. [In 1791 the destruction of harmful animals and birds was added to the existing law.] During the Revolution, however, the fines were done away with, and rewards were offered instead. The result was found to be that nothing was done. Then followed the law of 26 Ventose, IV. (February 17th, 1796), which, in spite of all the subsequent attempts at legislation, still* remains the only law, and this is practically inoperative. It ordered the destruction of caterpillars by the owners or the tenants of land; that the public lands were to be cleared by the agents; and that the adjoints were to be responsible for seeing the law carried out in their arrondissements where they found it neglected. They were required in such cases to engage workmen to do the work, and to recover the cost from those who should have done it. Within twenty days from the date fixed the *commissaires du directoire executif* were to visit the districts to see the law had been duly carried out, and to report to the minister. The penalty fixed was not less than three nor more than ten days' labour in addition to the repayment to the officials of the cost of the workmen they employed. It is hardly to be wondered at that this law should not be put in force. I recollect that at the congress held in September, 1876, in Paris, in connection with the "Exposition des insectes utiles et des insectes nuisibles," Mr. Murray elicited from M. le Baron de Pelletier, for many years maire of Lafarté, Melan-Aisne, that he knew many cantonnements where no conviction had been attempted for more than twenty years; and as for himself, he had never attempted to make any, since he did not see any use in clearing certain cantonnements while in neighbouring ones, under other jurisdiction, the pests were allowed to flourish, and were left to spread. Although this remained law for so long several endeavours were made for other laws.

In 1839 an attempt was made to repeal this law and substitute one that maires would not object to put in force, but, owing to a

* Unless a law has been passed that I have not heard of.

dissolution, the proposed law was not passed. Again, in 1849, a law was suggested by M. Richard, a distinguished naturalist, which included the useful proposal of an entomological commission of three to five members for each prefecture. This was referred to the Committee of Agriculture.

In 1851 another attempt was made to introduce the bill in modified terms, but this time the *coup d'état* interfered with its progress. All these attempts show that it was not indifference to the importance of the subject that has prevented the substitution of a fresh law for the impracticable law of Ventose. In 1872 M. Ducuing introduced a *projet de loi*, which was really the basis of the *projet* introduced in May, 1876, by MM. de la Sicotière, Grivart, and the Comte de Bouillé. It was taken into consideration on the 21st of March, 1873, and referred to a committee. The first reading was on the 10th of December, 1874; the second on the 5th of January, 1875. M. Ducuing died before the end of the session, and before his report on the amendments was completed. The *projet* presented in May, 1876, by MM. de la Sicotière, Grivart, and the Comte de Bouillé includes the spirit of the amendments. In the "*exposé des motifs*" they state that their only aim is to give legislative power and executive force to those views of which every one has long recognised the importance. They give several facts and figures as to the amount of damage done, and urge that the importance of legislative interference in such a matter has been recognised since 1796. They propose to extend to all harmful insects the law of Ventose IV. The chief provisions of their *projet* are that the destruction of the insects shall rest with landowners and tenants; the prefect, after consulting the conseil-général, shall notify the times to be selected for the destruction, as well as the methods to be employed for the different species. Arrangements are made for public lands, roadsides, and land bordering on railways. The maires and commissaries of police are to see the law carried out. In case of neglect the authorities are to have the work done and recover the cost from those who should have done it; and the fines are to range from ten to twenty-five francs for a first offence. The carrying out of the law is to be left with the Minister of Agriculture and Commerce; it is to extend to Algeria.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THE WEATHER, AND ITS EFFECTS ON LEPIDOPTERA.—*Apropos* of Mr. J. Jenner Weir's suggestion in the July number (Entom. xii., 179), I venture to give a few notes from my diary on the times of emergence of certain species of Lepidoptera in confinement, contrasting last season (1878), which was rather an early one, with the present unusually late one, collecting, for example, half a dozen species which I have reared numbers of each year. On account of the retardation in the advancement of vegetation this spring many of the hibernating larvæ did not make their appearance until very late; notwithstanding this I have found many to be more abundant than usual, the long and severe winter not diminishing their numbers. I usually begin searching for larvæ as soon as the hawthorn hedges show any signs of budding. *Orgyia fascelina* is generally the first to appear, and the earliest day I could find that species this year was April 6th; last year I found it as early as March 7th. The following species, kept indoors under similar conditions each season, will also show, in most cases, a great difference in the time of emergence:—*Smerinthus ocellatus* this year came out on July 9th; last year they first appeared on May 17th. *Sphinx Ligustri* first emerged this year on June 18th, compared with June 1st last year. The first imagos of *O. fascelina* this year emerged on June 29th; last year the earliest date was June 13th. Exotic species have also been affected to a considerable extent. *Attacus Pernyi* first appeared this year on May 26th; last year they were much earlier, the date being April 11th. *A. Cecropia* first "arrived" on June 22nd; last year this species began to emerge on May 11th. Another species, *A. Cynthia*, first came out on July 5th; last year the first emergence was on May 22nd. As the length of time is considerable in which some of the above-mentioned species are in the larval state—that of *A. Cecropia* being about ten weeks—it will be very late in the autumn before the larvæ are full fed. Yesterday (July 4th) a specimen of *Dicranura Vinula* emerged from the pupa; this species in an average season is due in May or early in June.—R. LADDIMAN; Norwich, July 5, 1879.

THE EFFECT OF THE LATE SEASON ON PUPÆ.—The date given by Newman and others for the appearance of *Orgyia pudibunda* is

May. Last year my specimens began to come out on 24th April; the year before on the 21st of the same month; but this year, in the same breeding-case and the same situation, the first did not make its appearance till to-day (June 4), about six weeks after time. So, though not with quite so remarkable a difference, the *Cucullia verbasci* have been about a month later than last year.—Rev. J. CAVE-BROWNE; Detling Vicarage, Maidstone, June 4, 1879.

NOTES ON THE SEASON.—PYRAMEIS CARDUI.—I can fully agree with Mr. Eedle as to the abundance of this insect. This year they were so plentiful that I took them in the garden close to the house, but they only continued for two days, for the heavy rain and wind drove them away. This is a very remarkable season both for larvæ and imagines. Larvæ that were abundant last year, such as *Auriflua cæruleocephala* and *Hybernia defoliaria*, are this year quite scarce, and *Tæniocampa stabilis* and many of the Geometers are plentiful. In May the little *Noctua plecta*, *Plusia gamma*, *P. iota*, &c., came to the raspberry blossom, and they have not turned up since. I used to capture them in August at the honeysuckle. On July 18th and 19th I was beating the oaks for larvæ, and to my great surprise captured *Agriopis aprilina*, and on the 20th my daughter found two *Amphydasia betularia* reposing upon the sweet pea; all were in splendid condition. Has the season anything to do with the pupæ that they should emerge earlier or later than usual, and why after a great scarcity does the next year bring forth in abundance?—S. BRADBURY; Abbots Bromley, July 22, 1879.

NORTHERN NOTES ON THE SEASON.—From every quarter comes the same lament of “no moths; wet, cold, miserable weather.” Everything that does turn up is very late: just fancy *Cidaria suffumata* out on June 26th; this *Suffumata* I shall remember. Being out mothing, and on a bridge which crosses a mountain stream, I was full stretch with my net on the end of my stick trying to reach an *Argyresthia* on a mountain ash, when down came all the rotten fabric and plunged me into the pool. As soon as I got breath from the cold shock I saw a moth under the bank, which was this *Suffumata*, which I must have splashed out. The weather keeps so bleak and cold and stormy that it is difficult to find a sheltered corner. However, last Saturday I

had an exploration of new ground on Greenthorn Fell, about three miles from here, and a mile or so from Stoneyhurst College. I note this specially lest any student there turns entomologist. It is just the place even for a new butterfly to turn up: acres of bilberry (knee deep), fine clumps of larch and Scotch fir plantations, fine old oaks, birch and alder, as well as beech, spruce, &c. On the hill-side grows the *Arctostaphylos uva-ursi*, from which I gathered a lot of *Tortrix* larvæ, and took *Lithocolletis vacciniella*, both the moths and the larvæ; also *Nepticula Weaverella*, and in the bilberry shoots larvæ abounded; and to note a few other species, even bad as the day was—*Gelechia longicornella*, *Coremia ferrugata*, *Melanippe tristata*, *Acidalia fumata*, *Eupithecia lariciata*, *Acronycta menyanthidis*, *Phoxopteryx myrtillana*, *Lasiocampa rubi*, and *Thecla quercus*, as well as other species. I found empty pupa-cases of *Dicranura bicuspis* on the alder. This makes me anxious to pay more visits to this charming spot. In the *Genista tinctoria* larvæ of *Depressaria atomella* and *Gelechia lentiginosella*, as well as *Cemiosoma Wailesella*, are in plenty; and among a clump of alders I took a score of *Nemophora metaxella*. *Ephippiphora turbidana* is just out, one specimen only. I expect the heavy floods in the Ribble will have washed lots of moths out to sea.—J. B. HODGKINSON; Dutton, Ribchester, July 6, 1879.

PYRAMEIS CARDUI AND COLIAS EDUSA AT BROADSTAIRS.—In the latter part of June *Vanessa Cardui* was very abundant, especially in the neighbourhood of the North Foreland Lighthouse; frequently when I was sitting by the roadside they would alight close by me. I also noticed a few specimens of *Colias Edusa*; three which I caught were all males.—HORACE FRERE; Sunny Bank, Queen's Road, Kingston-on-Thames, July 11, 1879.

ACHERONTIA ATROPOS NEAR FOLKESTONE.—A very fine specimen of *Acherontia Atropos* was brought to me on the 4th June this year, in good condition and newly emerged. Is this not very early?—W. H. CHEERSMAN; Cooling, Folkestone.

ACRONYCTA ALNI IN TILGATE FOREST.—I had the pleasure of taking, at sugar, *Acronycta alni*, in splendid condition, in Tilgate Forest, on June 16th.—C. HAMLIN; Brantridge, near Crawley, Sussex, July 20, 1879.

LITHOSIIDÆ IN THE NEW FOREST.—I agree with Mr. Lockyer (Entom. xii. 166) as to the rarity of *Lithosia complanula* in the New Forest; but my experience of that district does not enable me to confirm his statement as to the "entire absence of *L. mesomella* from the extensive heaths." On the contrary, I have always found *L. mesomella* the commonest of the Lithosiidæ in the New Forest, except *Calligenia miniata* and—in some seasons and localities—*L. quadra*. I have frequently taken from ten to fifteen specimens of *L. mesomella* in the course of an evening in various parts of the forest; and I may mention the heaths lying between the Southampton and Beaulieu roads, near Lyndhurst, and the "*Cribrum*" heath, near Ringwood, as the localities in which I have found this species most common.—H. GOSS; Barmouth, Merionethshire, July, 1879.

OCCURRENCE OF PACHETRA LEUCOPHÆA AT BOX HILL.—While collecting at the above locality, on July 13th, I was fortunate enough to capture a fine pair of this rarity, *in cop.*, on the trunk of a fir tree. They were exposed to the full force of a gale of wind and rain from the south-west, which had been blowing all the morning. On trying to get them into a large pill-box, they parted—no doubt being on the point of doing so before I touched them. The female has since very obligingly laid about 270 eggs, and I am rather interested to know how they will emerge, as they are laid very irregularly in one mass, but in four distinct layers, one layer on top of the other, so that one portion of the batch is four deep. The egg when first laid is yellowish green, round in shape, with the top of the shell wrinkled and drawn a little upwards; they have since changed to a dark drab, with the centre almost black, and the wrinkled portion a bright silvery colour, so that I expect in a few days they will emerge.—G. ELISHA; 122, Shepherdess Walk, City Road, N.

EARLY APPEARANCE OF MELANTHIA OCELLATA.—I found a pair of very fine specimens of *Melanthia ocellata* in cop. under an apple tree, in the vicarage garden, on June 12th, apparently just out of pupæ.—H. MASTERMAN; Clavering Vicarage, near Bishop's Stortford.

CAPTURE OF ARGYROLEPIA SCHREIBERSIANA.—I have been fortunate in capturing some good specimens of this rare and pretty species, whilst flying over mixed herbage and grass. At

present I am unable to give its food. From observations obtained, I fear there will be but little chance of breeding it. Could it be bred it would be an elegant species. The daily rains have made it most difficult to procure fine specimens.—F. O. STANDISH; 8, St. Paul's Terrace, Cheltenham, July 19, 1879.

PENTHINA POSTREMANA.—I have been fortunate again to have bred this lovely species, a specimen emerging yesterday.—J. B. HODGKINSON; Dutton, Ribchester, July 6, 1879.

DESCRIPTION OF THE LARVA OF RHODOPHÆA FORMOSELLA.—Larvæ of this species I received on October 3rd, 1877, from Mr. J. R. Wellman, of London. They were full grown, about five-eighths of an inch long, and of moderate bulk in proportion. The head has the lobes rounded, is a trifle narrower than the second, but quite as wide as the third segment. Body cylindrical and of nearly uniform width throughout; the skin has a slightly wrinkled and velvety appearance, except on the second segment, where it is smooth, and has a rather polished horny appearance: there are a few scattered hairs. Ground colour, dark velvety green; head of the same colour, but very faintly and indistinctly freckled with grayish. Two fine interrupted grey lines extend throughout the dorsal area; below them is a similar subdorsal line, followed by two more similar lines between it and the spiracles; and again a similar one along the spiracular region: there thus being five of these grey lines on each side. Spiracles imperceptible. Ventral surface uniformly dark green, powdered, especially at the segmental divisions, with whitish.—GEO. T. PORRITT, Highroyd House, Huddersfield, June 4, 1879.

NEMOTOIS SCHIFFERMILLERELLA BRED.—From the larva of the above insect, mentioned in last month's 'Entomologist,' I have at present bred—two lovely specimens on July 16th, three on the 18th, and one the next day; so that I am in hopes of breeding a nice series. They seem to emerge from 10 to 12 A.M., and are very active soon afterwards, particularly if the sun shines on the cage. It is very satisfactory to know they have proved to be the species they were expected to be.—G. ELISHA; 122, Shepherdess Walk, City Road, N.

SITOPHILUS ORYZÆ.—In the course of last year I had an opportunity of making some observations on the life-history of the *Sitophilus (calandra) oryzae*, published in the February number

of the 'Entomologist,' in which, though able to trace the larva onward in its development, and also able to find the punctures of oviposition in the corn-grains very numerous, I failed to discover what I could feel absolutely certain were the eggs. I found minute ovate spherical bodies (Entom. xii. 52), both in the corn and in the weevils, but could not feel perfectly sure of their nature. In the course of the last few days I have received a paper by Professor C. V. Riley on the subject of the rice weevil, printed in the March number of the 'Farmers' Review' (Chicago), which leaves no doubt on my mind that these objects were the eggs, and his full description will be of interest. He says, regarding the position of the egg,—“The puncture is somewhat curved, rather less than one-sixteenth of an inch deep, and rather narrower at the bottom than at the opening. The egg, which is 0·5 mm. long, elongate, ovoid, and translucent, is pushed to the bottom, and the whole space above it is then filled in with particles of grain gnawed into a fine powder like flour, the orifice being pasted with a little saliva.” Professor Riley's article gives much practical information, but from my own observations of the habits of this and the closely-allied species, *S. granarius*, I should like to add to the remedial and preventive suggestions the plan of trapping by setting vessels of water, as far as experiment with the pests of one badly infested granary can be trusted: the weevils would in this way be attracted from the corn in enormous quantities, and easily destroyed by throwing the stupefied insects into the fire.—E. A. ORMEROD.

CECIDOMYIA TRITICI.—This is indeed a curious season. This evening the wheat midge (*Cecidomyia tritici*), parent of that injurious pest the “red maggot,” is especially abundant, and there is not a wheat ear to be seen.—EDWARD A. FITCH; Maldon, Essex, June 27, 1879.

REVIEW.

A Synopsis of British Butterflies. By J. T. OPENSHAW. Second Edition. Watson Joll, 25, Bull Ring, Horncastle.

THIS is a simple synopsis of the British butterflies, printed on a card, so that it may be always at hand for the student. The card is divided into five columns headed as follows:—Name, Larvæ, Food-plant, Pupa, Month of Exit. The following is

an example:—*Argynnis Paphia*; black-yellow lines; violet, nettle, wild raspberry; grey-silver spots; July. The idea of this synopsis is a good one, but it might be much further developed. More attention might also be paid to the food-plant; for example, *Thecla rubi* is said only to feed on bramble and broom, its usual food, birch, not being mentioned. This card will be found, nevertheless, of use to the collector of butterflies, and is well worth the small sum charged for it.—ED.

OBITUARY.

THOMAS WEST.—It is with much regret that I have to announce the death, at the age of thirty-eight years, of Mr. West, of Liverpool, since its formation one of the best-known members of the Lancashire and Cheshire Entomological Society. By occupation a fitter in a Liverpool engineering works, he added to a pure delight in nature a technical knowledge of Entomology, and a power of laborious and patient investigation which would have made him known to a wider circle had the circumstances which surrounded him been more congenial to the pursuit of his favourite study. His attention was directed principally to the Lepidoptera, and few men had a more thorough acquaintance with, or had studied more minutely, this group as locally represented. Unfortunately, the result of his researches, except as represented by an excellent collection, passes away with him. Ever ready to impart his knowledge and experience to younger entomologists, his death leaves the society of which he was a member deprived of one of its most useful members. It may be very doubtful how far a too constant attention to any natural study may advantage a man when unguided by the education which would teach him its proper place and value. Still, it must be a subject for congratulation that there live among the working classes of our large towns men such as he to whom has been given a higher appreciation of nature, and the possibility of purer and more profitable recreation than is possessed by the majority of their fellows in the same walk of life. The widow and family of Mr. West having been by his sudden death left in great destitution, a fund has been initiated by the society to which he belonged for their relief. Contributions are received by the Secretary of the Society, 6, Colonial Chambers, Temple Street, Liverpool. —W. E. SHARP; Hon. Sec., Lanc. and Ches. Ent. Soc.

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LOCALITIES FOR BEGINNERS.

No. III.—DARENTH.

By JOHN T. CARRINGTON.

HAVING taken our ticket at one of the London Termini of the South Eastern Railway for the quaint little town of Dartford, in Kent, we arrive there in the course of an hour, for half-a-crown return fare. There is little in the town to arrest our attention, so walking away from the railway-station over the bridge, and leaving the water-mill to the left, we turn sharply to the right, through a narrow passage which leads by an ascending path through a meadow to the road. The first turn to the left leads between two high banks to the Brent—an open space famous for martyrdoms by fire in the reign of Queen Mary, and more recently for a long law-suit between the local authorities and a neighbouring landowner, the latter having laid claim to the property of the people. Just as we get on the edge of the Brent there is a footpath on the right, across the fields, which leads to the high road to Green Street Green. Following the road to the right will take us to the "Fox and Hounds" public-house, so well known to the older London entomologists, and immediately under Darenth Wood, better known in the vernacular as "Darn."

The Green Street Green road will be found fine collecting ground up to the wood. Many nice plants grow by the roadsides, and the hedges produce, by beating, some of the best Tortrices and Geometers found in the county of Kent. By examining the flowers of the field-scabious (*Knautia arvensis*) both in the day-time and by night, in July and August, may be found the pretty moths of *Eremobia ochroleuca*, often quite commonly. It is from these hedges that the scarce and local *Tortrix semialbana* has been beaten out in July. Amongst the *Clematis vitalba*, which

hangs in festoons on the hedges on each side of the road, occurs, commonly in July, *Iodis vernaria*, which, when fresh, is of such lovely green colour. In the hollow, where the road opens into a green patch on the left-hand side, was, years ago, the locality of the so-called Dartford blues. They were really, dark forms of *Lycæna Adonis*, and probably an hereditary variety. The posts of the wire fence were famous as a resting-place for the rare and beautiful *Xylomiges conspicillaris*, where they have on several occasions been found at rest during the first sunny days of April and early May. The collector, with a quick eye and with a little practice, need not despair of taking this rarity. Amongst some patches of horehound (*Ballota nigra* = *B. foetida*) in June will be found specimens of the brilliant little rarity, *Nemotois Schiffermillerella*. An interesting account of the discovery of the larvæ of *N. Schiffermillerella* is given by Mr. George Elisha in the 'Entomologist' of this year, at page 183. This species has also been found flying over the elder (*Sambucus nigra*) flowers in the sunshine. An example of the tenacity of an insect in clinging to a locality after most of its food-plant is gone, and other surroundings are changed, may be quoted in *Eupithecia sobrinata*, which is, near this spot, to be bred or beaten from the few stunted junipers which remain. Much, as will be seen from the few foregoing species selected, is to be done by the road-side before reaching the "Darn" wood itself. Quite a multitude of both Macro- and Micro-Lepidoptera occur by the way, and at some seasons of the year enough will be found to occupy the collector for a long afternoon, without actually going to the wood.

Should the day upon which the young lepidopterist first visits Darenth be a summer's day—such as we have this year had to content ourselves with imagining rather than enjoying—his thirst may tempt him to visit the "Fox and Hounds." Should he enter, he ought not to forget that nearly every British entomologist whose works have handed on his name to our present generation has, at some time or other, refreshed his weary body in the same house under similar circumstances. If he has only well read his authors, many pleasant associations will occupy his thoughts during his short rest, in picturing to himself the old times when they used to meet in the very room he now uses. But we have little time for dreaming in this nineteenth century; for even in moth-catching we must push forward if we are to keep

our place in the scramble for success; so let us now go on to the wood.

Darenth—or as I said, more familiarly known as Darn—Wood consists chiefly of oak trees, but there is a fine undergrowth of hazel, birch, sallow, aspens, &c.; while amongst the flowering plants are many which give joy not only to the botanist but to the entomologist. One of the most common is the golden rod (*Solidago virgaurea*); this in some parts is in profusion. Common also are several St. John's worts (*Hypericaceæ*); while in spring the wood is covered with masses of bluebells (*Endymion nutans*) and primroses (*Primula vulgaris*). In the surrounding fields is plenty of ragwort (*Senecio Jacobæa*), the flowers of which, as is well known, are prolific, whether for larvæ of *Eupithecia*, &c., or for attracting many moths both by day and by night, in August and September.

A path, which turns to the left of the "Fox and Hounds," will take us to what is known as the Four Leet, meaning the meeting of four paths or rides in the wood. Of these four, that to the left is closed, but, so far as I know, the other rides in the wood are now open. In the good old times—and it seems safe to say that all old times were good—*Apatura Iris* used to frequent the oaks here about; while *Argynnis Paphia* and *A. Aglaia* still remain. Much good work may be done in the daytime on most days during an ordinary season by beating the trees by the side of the paths, as well as by sweeping the grass in the rides. Amongst the many species of Lepidoptera to be captured, there are, in the daytime, *Chelonia plantaginis*, *Stauropus fagi*, by searching trunks of trees; *Sesia culiciformis*, round the birches. Amongst the bushes may be disturbed—*Platypteryx falcata*, *P. lacertula*, *Geometra papilionaria*, *Selenia lunaria*, *Corycia taminata* and *temerata*, *Eupithecia expallidata*, *Himera pennaria*, *Hybernica defoliaria* and *Cheimatobia boreata* in their respective seasons.

At sugar, which is best applied on the outskirts of the wood and by the sides of the rides, many charming species of Noctuæ may be taken, such as *Thyatira batis*, *T. derasa*, *Cymatophora duplaris*, *Acronycta tridens*, *A. leporina*, *A. aceris*, and *A. alni* has been taken. *Dipterygia pinastri*, *Cymatophora ocularis*, *Cerigo cytherea*, *Agrotis saucia*, *Triphæna janthina*, *T. fimbria*, *T. interjecta*, *Noctua glareosa*, *N. triangulum*, *N. C.-nigrum*, *Orthosia*

suspecta; *Cerastis erythrocephala* has also been taken. *Xanthia citrigo*, *X. silago*, *X. cerago*, *Epunda lutulenta*, *E. viminalis*, *Agriopsis aprilina*, *Aplecta herbida*, *A. tincta*, *Hadena protea*, *H. suasa*, *H. contigua*, *H. geniste*, *Calocampa vetusta*, and *exoleta*, with several *Cucullia* and *Catocala nupta*.

Another fruitful source of entomological riches is the ivy in autumn. No sooner are the flowers well out on the bushes, which are to be found in many places, not only on the roadsides from Dartford but also in the wood, than many rarities are to be captured while enjoying the sweets of the flowers. Amongst these are, in the daytime, the *Vanessidæ*, while at night the ivy is frequented by many of our rarer *Noctuæ*; but while working it, it is well to have with us a little weak ammonia, to be applied as an antidote for the wasp stings, to which we are liable from the many wasps which sit on the flowers in a state of semi-intoxication.

The sallows at Darenth are not numerous, but they are good. So soon as they break into yellow bloom in spring, do we find them occupied, after dusk, by nearly the whole of the genus *Taniocampa*, amongst these *Miniosa* not uncommonly. Also hibernated specimens of many *Noctuæ*,—the females of which should be kept for ova,—*Hoporina croceago*, *Calocampa vetusta*, and *C. exoleta*; also *Xylina semibrunnea* and *petrificata* are amongst the scarcer.

In the fields surrounding the wood much good work may be accomplished. In those now occupied by the Asylum, *Agrophila sulphuralis*, *Acontia luctuosa*, in profusion; *Pyrausta purpuralis*, commonly; with *Spilodes palealis* amongst the wild carrot (*Daucus carota*), upon the flowers and seeds of which they feed, used to occur; and I have no doubt most of these species will be found in other fields in the immediate neighbourhood. In these fields also the ragwort should have especial attention, for at the flowers by night many *Noctuæ* and *Geometers* may be taken by the aid of a lamp in August and September. At the gas-lamps, on the homeward journey, if any room still remains in our boxes, many moths will be found attracted by the light; *Cirrhodia zerampelina* amongst them, late in August or early in September. When this handsome moth was rarer than now, I have many times scraped my shins—and was pleased to do so—to get a specimen down from a lamp. But one day I bethought myself of the better way of looking for them, when drying their wings

immediately after emerging from the pupa, about a foot or two from the ground, on the boles of the ash trees (*Fraxinus excelsior*). I was rewarded, much to my astonishment, by finding some fifty specimens "finer than bred," on my first search. I believe there are not many isolated ash trees near Darenth, and, as may be well understood, isolated trees are the best; but such as there are ought to be searched in the afternoon and evening before dusk. I think it not improbable this style of collecting might be carried further with advantage. I know in some Scotch fir (*Pinus sylvestris*) woods, *Thera firmata* occurs in a like manner, for I have frequently taken a fine series, with limp wings, by looking for them on the fir trunks an hour or two before dusk.

On the flowers and leaves of the golden rod should be found the larva of *Cucullia asteris*, *C. gnaphalii*; also larvæ of *Ennychia octomaculalis*, while at the same time are those of *Eupithecia expallidata*. On the aspens (*Populus tremula*), are larvæ of *Dicranura furcula*, *D. bifida*, and *D. vinula*; also *Clostera curtula* and *C. reclusa* in spun leaves. *Tethea retusa* and *T. subtusa* are there feeding, like the *Closteras*.

In the wood and in the neighbourhood many rare and beautiful Pyrales and Tortrices occur. Some at sugar, for instance *Hypenodes albistrigalis* and *Phycis roborella*. In the dusk of evening may be taken, on the wing or during the day disturbed from the trees, *Scoparia basistrigalis* and *S. Zelleri*: the same applies to *Sarrothripa Revayana*, *Halias quercana*, *H. prasinana*, *Leptogramma literana*, *Penthina prælongana*, *Sericoris bifasciana* (rarely), *Phoxopteryx ramana* (commonly), *Phlæodes immundana* (occasionally); *Eupæcilia maculosana*, frequently in abundance; *Spilonota simplana*, rarely; and many good Tineina.

On an elm tree (*Ulmus campestris*), in front of the "Fox and Hounds" Inn, may, in most seasons, be found a brood or two of larvæ of *Vanessa polychloros* in June. The pupæ also are often to be found hanging under the window-sills, &c., of the same house a little later in the season.

Perhaps the best months for the capture of lepidopterous larvæ, by beating the trees and bushes, are August and September. Darenth Wood is a fine place for the purpose. Many larvæ have been taken there, such as *Sphinx ligustri*, *Macroglossa fuciformis*, from honeysuckle (*Lonicera*); *Limacodes testudo*, numbers of

Geometers, and *Stauropus fagi*, off oak and other trees; *Notodonta camelina*, *N. carmelita*, *N. dictæa*, *N. dictæoides*, *N. dromedarius*, *N. ziczac*, and many Noctuæ off the oak and birch.

Little difficulty may be feared from interference from the proprietors. But should that occur there is plenty of work to engage us on the paths through the wood, and in the neighbouring lanes, especially towards Greenhithe. Altogether Darn may be set down as one of the best woods for Lepidoptera in the London district. Many have been the rarities taken there, and I hope many more may still be taken. I have to thank Mr. Farn for much information about Darenth.

Royal Aquarium, Westminster, S.W., August, 1879.

NOTES ON SPERCHEUS EMARGINATUS, &c.

By VINCENT R. PERKINS.

THIS rare insect has been added to my collection through the kindness of my friend, Mr. T. R. Billups. During the few fitful gleams of sunlight which have penetrated through the aqueous clouds so very prevalent this season—I will not call it summer—he has taken several opportunities of visiting and examining the ditches and ponds in the eastern or south-eastern districts of London for aquatic Coleoptera and other insects therein contained. I have to thank him not only for this insect but also for other Coleoptera which I had not met with, as well as for a fund of information relative to the habits of these insects, which is certainly very interesting.

This *Spercheus* is, I imagine, in very few collections, and some coleopterists say it has not been met with for many years—for a period so long that it has been reckoned among the things that no longer occur in this country. Many collectors had given up all hope of meeting with it, and have omitted it from their desiderata, leaving no vacancy for it in their cabinet. It turned up, however, as most other varieties do, in a most unexpected manner. One day last season a small ditch, which had been cut for the purpose of irrigation, after a heavy thunderstorm, became full to overflowing, and Mr. Billups, looking on the escaping water, saw two or three of these beetles floating along on their backs, and fished them out. These he took and showed to his friend, Mr. Champion, who at once pronounced them to be the

long-lost *Spercheus*. Elated with success, Mr. Billups went again, a few days afterwards, to the same place, and was again rewarded in his search, and this time brought home two females carrying their very singular bag of eggs. This season he has worked the same ditch several times during the months of June and July, and again met with the insect in sufficient quantity to spare myself and other friends type specimens. This year males and females were captured, but the majority being females (almost all of which had the egg-pouch attached to the abdomen), he feels convinced that period of the year is the breeding season. The pouch-carrying is most interesting; the bag itself is made of a thick silky material of a pale brown colour, several shades lighter than the insect itself, very closely spun or woven, and slightly inflated, like the bag of a spider. It covers the whole of the abdomen from the middle pair of legs, and is seemingly held in place by the hinder pair, it being greatly indented or pinched in by the knee-joint of the tibiæ.

Spercheus evidently does not, like most other water-beetles, attach her nest to any of the varied water-plants which abound in ditches, but carries it about with her until such time as the eggs hatch and the young larvæ come forth; these are little black things about one line in length, and much resembling other larvæ of aquatic Coleoptera. Each of these bags contains about half a hundred eggs, and in two instances Mr. Billups has counted over seventy eggs in one pouch. He tells me he does not think that the larvæ are plant-feeders, as has been stated, but decidedly carnivorous, whatever the imago may be.

Mr. Rye, in his work on 'British Beetles,' states that in a few hours after disclosing the larvæ from the sac or pouch, the female at once forms another. I question this very much, and believe that only one bag and one set of eggs is produced during a season. My friend has, at the time I am writing, several females which he has kept above two months in his aquarium, and which hatched their larvæ. They were captured in the early part of June, and although they are in the company of males, and are frequently seen *in cop.*, and have plenty of weed and shelter, still there is not as yet (August), at any rate, the slightest sign of a second sac being formed; but no doubt we shall know more about this insect shortly.

Another interesting capture from the same locality is *Hydrous*

caraboides, also with its nest and eggs: this beetle does not carry a pouch about with it like the *Spercheus*, but makes its nidus by rolling up a leaf or anything else that comes in its way. One of the leaves of some pond-weed is generally selected, and it lines this with a thick cottony web-like substance, and in this the eggs are deposited to the number of about thirty or forty.

In 'Science Gossip' for June last there is a paper on *Hydrous piccus*, the great water-beetle, with illustrations, which give some slight idea of the nest, but that which is supposed to illustrate the deposition of eggs in the nest is very incorrect. The eggs are not deposited higgledy-piggledy as represented, but with great uniformity, each being placed side by side with the greatest exactness, standing on end upright, in shape like elongated cylinders.

As regards the nest: the leaf, a floating one, is drawn over from the end towards the petiole, leaving the petiole always uppermost, and the sides are drawn down and firmly fastened to the roll with a kind of gummy secretion, so that the nest is quite water-tight; inside is a thick layer of cottony substance of a pure white colour, and in the middle of this the eggs are deposited, as I said just now, in a horizontal position, side by side. They are about a dozen or so in number, of a beautiful crocus-yellow colour. These nests were plentiful in the beginning of June, but since then none have been met with; the eggs of some of these hatched out very soon after they were brought home, and the larvæ were little thread-like things with enormous jaws, and evidently very rapacious. This insect's nest was generally attached to a leaf of *Sparganium ramosum*, but my friend tells me he has frequently taken it in a pond where nothing grew but *Lemna minor*, and then any floating substance, even pieces of old newspaper, were made use of.

54, Gloucester Street, S.W., August 6, 1879.

THE TORTRICES OF SURREY, KENT, AND SUSSEX.

By WALTER P. WESTON.

(Continued from p. 188.)

In the following list I have adopted the arrangement of the Doubleday list, and have mentioned the counties in which occur the localities given; but in many instances where the insect is of very

general distribution, and no localities are given, it may be expected to be met with in suitable situations throughout these counties.

Halias prasinana.—Common in almost every wood; it may be taken freely in the evening flying over the tops of the bushes, but generally out of reach of the ordinary net. It is also frequently to be obtained, both in the larva and imago states, by beating oak trees, &c. The pupa is enclosed in a very neat cocoon of a light brown colour, spun between twisted leaves or pieces of bark, and, in the latter case, is not easily detected.

H. quercana.—Not so common as the preceding species, but fairly distributed. It has been taken somewhat freely in Kent, at Dartford and Sevenoaks; and in Surrey, at Croydon and West Wickham Wood: it has also been recorded from Haslemere and Lewisham; and in Sussex from the neighbourhood of Hastings. It comes to sugar, and is easily reared from the larva.

H. clorana.—Tolerably common in osier-beds, where the larva is to be met with far more frequently than the imago. It used to be plentiful along the Surrey banks of the Thames around Hammersmith and Kingston. A single specimen is recorded from Hastings.

Sarrothripa Revayana.—Has been met with in all woody localities in these counties, but is nowhere common. I once secured a dozen specimens in one afternoon in a wood at Ashtead, but I worked for them the whole afternoon, and found the majority were disturbed from some large holly bushes rather than from the oaks. Its capture is mentioned in every list I have received, the nearest points to London being Croydon and Lewisham.

Tortrix podana, Scop. = *pyrastrana*, Hub.—Tolerably common everywhere, and most abundant in gardens.

T. cratagana, Hub. = *roborana*, Hub.—Widely distributed, but scarce, being usually found in oak woods; it is recorded from Darenth, the neighbourhoods of Gravesend and Sevenoaks, and I have taken it at Folkestone; the Surrey localities are Ashstead and Haslemere, and the Sussex ones Lewes and Hastings.

T. xylostearia, Linn.—Abundant everywhere.

T. sorbiana, Hub.—Not uncommon in oak woods; at Croydon I have found it very common some seasons.

T. rosana, Linn.—Abundant everywhere.

Tortrix dumetana, Treit.—This local species is confined to Sussex, in the neighbourhood of Lewes, where it has been taken in some numbers. As it occurs there in oak woods it appears not improbable that it may be a distinct species from those taken in the fens.

T. diversana, Hub. = *transitana*, Gn.—I have met with this insect abundantly in Surrey among old elms around Esher, and occasionally at Putney. Mr. West records it plentifully from Greenhithe, and it may be expected to be met with wherever old elms occur.

T. cinnamomeana, Treit.—A local and not common species, having been met with in Kent, in the neighbourhood of Dover, and formerly, though not of late years, at Darenth Wood. In Sussex, at Tilgate Forest; while the Surrey localities are Haslemere, Woolmer Forest, Mickleham, and Weybridge. It occurs amongst, or in the neighbourhood of, beeches, and may easily be distinguished from the following species by the white head and palpi of the male and the bright rosy red hue of the female.

T. heparana, W. V.—Common everywhere.

T. ribeana, Hüb.—Common everywhere.

T. corylana, Fab.—Somewhat common, and may be met with in tolerable numbers among hazel and birch trees.

T. unifasciana, Dup.—Common everywhere.

T. semialbana, Gn.—This species appears to be much scarcer than it was in former years, and is now much wanted in collections. Mr. Stainton, in his 'Manual,' gives as localities Darenth and Mickleham, but I have not heard of any recent captures at either locality. Mr. W. West has recorded it from Greenhithe.

T. costana, Fab.—A far more generally distributed species than the preceding, and occurring throughout these counties, feeding on *Epilobium* and various low-growing plants. It is usually to be met with in low or marshy ground outside woods.

T. viburnana, W. V.—Generally distributed, but more abundant on moors and heaths; it is very abundant on the moorland between Uckfield and Tunbridge Wells.

T. pallana, Hub. = *icterana*.—The larva of this species may be far more often met with than the imago; it feeds chiefly on *Centaurea nigra*, and the broad and narrow-leaved plantains. The imago is generally distributed, and may frequently be captured

flying slowly in the dusk along railway banks, roadsides, and broken ground.

Tortrix viridana, Linn.—Only too common everywhere.

T. ministrana.—Generally common.

T. Branderiana, Linn.—Widely distributed, but scarce. It is recorded from several Kentish localities—Darenth, Greenhithe, Folkestone, and others: the imago is not uncommon near Stroud, but flies high and is difficult to catch. It has been bred from Darenth Wood from united leaves of aspen, and the larva is also to be found between united or rolled-up leaves of other species of poplar, and of honeysuckle.

T. Forsterana, Fab. = *adjunctana*, Treit.—Distributed throughout, but not commonly: my friend Mr. Howard Vaughan met with some numbers feeding in rolled-up leaves of ivy in his garden at Bromley, Kent. It appears scarce at Hastings, the Rev. E. N. Bloomfield having only recorded one specimen from that district. It should be remembered that all the insects of this family come readily to sugar, especially if it is put on early in the evening.

Dichelia Grotiana.—Distributed throughout the south-eastern counties, but not abundant; it appears a general feeder, but is more frequently taken among hornbeam, maple, and birch. It comes to sugar freely, and though it appears not uncommon in woody districts, is much wanted in collections.

Amphysa Gerningana.—I have only seen a single example of this insect from these counties, which was taken by Dr. Battershell Gill in a wood in the north of Kent. I had the pleasure of seeing the specimen on his setting-board, so have no doubt as to the locality of its capture.

Leptogramma literana, Linn.—Widely distributed, but not common, in oak and other woods, where it may be disturbed from the boughs and trunks of trees in August and September, when it flies a short distance and then drops and feigns death, and is seldom to be roused a second time, if missed at the first attempt. Hybernated specimens are occasionally to be met with in the spring. In Kent it has been taken at Darenth, Greenhithe, Folkestone, &c.; in Surrey, at Croydon, Haslemere, and West Wickham; while in Sussex it occurs at Hastings and Lewes.

P. scabrana Fab. = *boscana*, Fab.—These insects, which have

now been proved to be only forms of the same insect (Entom. x., p. 303), occur plentifully at Darenth Wood, and I have no doubt in several other Kentish localities. I have seen a single specimen from Croydon, and it is said to occur at Tunbridge Wells and Sevenoaks, but I have not been able to verify the specimens.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LATE CAPTURES AT FOLKESTONE.—While at Folkestone last month I was not a little surprised to find the first brood of *Lycæna Adonis* still out in fine condition, both males and females; in some instances only just emerged from the pupa. I left on the 19th, the morning of which date I paid my last visit to Castle Hill, where I found this species still out in abundance. I also took a few fresh specimens of *Procris globulariæ* and others worn, and three *P. Geryon* at the same locality; these species, I think, are fully a month beyond their usual time of appearance, and this will make the second brood of *L. Adonis* very late.—J. R. WELLMAN; 14, Portland Place North, Clapham Road, S.W., Aug. 20, 1879.

CAPTURES IN NEW FOREST.—Whilst collecting in the New Forest during the latter half of July, I took a couple of *Macroglossa fuciformis* in fairly good condition. *Boarmia roboraria* was just appearing: I took one at sugar on the 21st. *Diphthera Orion* was fairly abundant, in good condition. *Limenitis Sibylla*, *Argynnis Paphia*, *A. Aglaia*, and *A. Adippe* were also just appearing.—N. C. GRAHAM; Silwood, Tulse Hill, S.W., August 12, 1879.

COLIAS EDUSA AND PYRAMEIS CARDUI.—*Pyrameis cardui* is now excessively common, as it was in the early summer, but all the specimens have a somewhat worn appearance about them, as if they were last year's insects. On the 2nd August I turned out of a clover field a female *Colias Edusa*, the only one I have seen this season.—JOSEPH ANDERSON, JUN.; Chichester.

LYCÆNA ARION AND THE LATE SEASON.—It was on June 17th, 1866, that I first saw *Lycæna Arion*. I was then a tyro, and it was my first tolerably good capture. It has, therefore, naturally been a "pet" with me since. For several years I have

given up all active collecting, but every season I have made a few visits to *Arion's* haunts on the Cotswold Hills; and I have taken it more or less sparingly every year. The dates of first capture I have recorded are as follows:—June 17th, 1866; June 20th, 1867; had probably been out some days in these two years: June 5th, 1868; June 13th, 1869; 1870, exact date not kept, but it was early—about the 10th. This was the best year for *Lycænidæ* I remember. One fine evening I found five *L. Arion* at rest within a few inches of each other, and close by were six *L. Agestis* asleep on one stalk of grass. Five of these I boxed straight off into one pill-box. Since 1870 I have kept no regular account of dates, but have found that the 10th to 20th June should be considered as the date due for *Arion*. I have never taken any in July, except old worn specimens. In 1867 and 1868 they have been rather later. This season I have made periodical visits to the ground since June 18th, but the first specimen seen was July 8th. Then came more bad weather, and it was a week before another was seen. This species has continued emerging and in fair condition to the very end of July, but has been unusually scarce. This makes *L. Arion*, which I have always considered a very regular species in its appearance, to be four to five weeks later than in average seasons.—H. W. MARSDEN; Regent Street, Gloucester, August 11, 1879.

CALLIMORPHA HERA.—It may possibly be of some interest to readers of the 'Entomologist' to know that I captured *C. Hera* the year before last at Bonchurch, Isle of Wight. It was a moderately good specimen.—H. ROWLAND-BROWN; West Walton Rectory, Wisbeach, August 10.

PLUSIA ORICHALCEA.—I was at Wotton-under-Edge three days last week, and favoured with tolerably fine weather. I strolled about the old haunts to try and pick up some insects. On the hills the little *Lycæna Alsus* was fairly plentiful, but in so worn a condition that I left them alone; other blues scarce. *Arge Galathea* in great abundance, as also the Common Ringlet (*Satyrus Hyperanthus*). In the woods little was astir in the daytime but a few *Minoa euphorbiata* in the thicker portions, and in the cleared portions *Chelonia plantaginis* rose up every now and then as I went along; and, in following up one of these, what should I see sitting on a plant of *Mercurialis* in front of me but *Plusia*

orichalcea—a fine male, his wings shining in the sun. My net was over it in a moment, and it is now on my setting-board. I beat about all the following day, but could not find a second specimen. This insect was taken in the same place in September, 1858, since which time I have not heard of its being captured.—V. R. PERKINS; 54, Gloucester Street, S.W.

ACRONYCTA ALNI AND PLUSIA ORICHALCEA AT WOODCHESTER.—I took a specimen of *Acronycta alni* in July at rest on a stone wall during the day, and on the 8th of this month my companion, the Rev. H. Reader, took *Plusia orichalcea* at rest on a frond of mountain fern in the morning, and I had the like good fortune, in the afternoon, of finding another perfect specimen at rest, evidently just emerged.—[Rev.] H. S. B. GATES, O.P.; Dominican Priory, Woodchester.

ABUNDANCE OF PYRAMEIS CARDUI AND PLUSIA GAMMA AT BATTLE.—This last week *Pyrameis cardui* has appeared in this neighbourhood in very great abundance. *Plusia gamma*, also, has been unusually plentiful.—THOMAS HOWE; Normanhurst Court, Battle, Sussex, August 17, 1879.

ABUNDANCE OF PYRAMEIS CARDUI AND PLUSIA GAMMA.—Adverse as the weather has been to vegetable and insect life generally, this season there must have been something in it singularly favourable to the development of *P. cardui* and *P. gamma*. The former are swarming here in thousands, and the latter in tens of thousands. With the doubtful exception of gnats on a calm summer evening I have never seen any species of insect so multitudinous.—W. McRAE; Westbourne House, Bournemouth, August 25, 1879.

EXTRAORDINARY ABUNDANCE OF PLUSIA GAMMA.—In the August number of the 'Entomologist' (Entom., xii., 194), Mr. Fitch, in a very instructive article, has given some details respecting certain enemies to our pea crops, which did much injury in the spring of this year. And now another army of depredators has come forth to the attack, for our farmers—at least those of this district—have been ruefully lamenting the havoc committed by immense numbers of the larvæ of *Plusia gamma*, whole fields of peas being well-nigh stripped bare of leaves by them, thus arresting of necessity the subsequent development of the peas in the pods. I collected on the 5th

August a quantity of the larvæ, which were then nearly full-fed. In the course of three or four days they spun their cocoons and turned into pupæ, the perfect insects emerging on the 14th, so that the pupa state lasted but the short time of six or seven days. The thrushes (*Turdus musicus*), which are this year unusually numerous, congregated in the fields in large flocks; doubtless fed sumptuously every day on the larvæ, which they must have considerably diminished. As an instance of the ignorance of many agriculturists on questions connected with Natural History, and their stupid inability to discriminate betwixt their friends and foes, I may mention that, because they found the thrushes at the peas, some attributed the mischief to "them rascally birds," and were for "shooting them all off." The imagines of *Plusia gamma* are now swarming in every direction, and fly from the flowers and hedges more like bees than moths. They are equally abundant by day as by night; anything like this profusion I never remember. I insert this note in order to ascertain if other districts have been similarly affected.—JOSEPH ANDERSON, JUN.; Chichester.

PROFUSION OF *PLUSIA GAMMA*.—The sandhills and neighbourhood of the sea on the Essex coast are this August infested by a multitude of the moths of *Plusia gamma*. So large are the numbers that they almost pass description. It is no uncommon thing to see ten to twenty specimens fighting with one another to get at a single thistle-flower, to the exclusion of all other insects.—JOHN T. CARRINGTON; Royal Aquarium, August 16, 1879.

FLIGHT OF *PLUSIA GAMMA*.—Under date August 13th, a son of mine writes me from St. Leonards that the sea there is scattered over with moths which are being washed up in lines on the shore. The boatmen state that nothing similar has been witnessed previously; but no one seems to have noticed whether the moths have come over from France or have been drowned in attempting to leave England. The specimens sent me are *Plusia gamma*, and I do not learn that any diversity of species has been detected among the multitudes. Moths, I believe, are more rarely known to collect in swarms and to set out on pilgrimage than are butterflies.—J. W. SLATER; Ivy Cottage, Bicester Road, Aylesbury.

PYRAMEIS CARDUI AND *PLUSIA GAMMA*.—If *Pyrameis cardui*

is as generally abundant as it is at the present moment in this district, you will, no doubt, very shortly receive many notifications of it. During the past May and June the number of apparently hybernated examples was unusually large, and the present flight has, without a doubt, been bred from them, for all are now evidently fresh from the chrysalis. Each day the number appears to increase, the first having come out about ten days ago. Many years past (I think somewhere about the year 1850), in the month of September, this butterfly was in great profusion here; since then it has been comparatively scarce. Its abundance now may be imagined from the fact that to-day I observed upwards of a score together on a few thistle-blooms in a lane close by. On the heather (now in full bloom) it is dispersed in every direction. Several often fly up together, with a constant succession of one, two, or three at a time; and now and then quite a concourse in some specially bright or sheltered nook. Even more abundant is (the never very scarce moth) *Plusia gamma*; in fact, it is just now a pest to the collector. In some spots, among flowers much delighted in by this moth, it is no exaggeration to describe it as rising in a swarm. All hopes of capturing a rarity, should there be such among them, is quite at an end amid such a bewildering flight of these restless moths. Whatever bad effect, therefore, the present ungenial season may have had on other Lepidoptera, there has evidently been something especially favourable in it for the two species mentioned.—[Rev.] O. P. CAMBRIDGE; Bloxworth Rectory, August 18, 1879.

PROFUSION OF *PLUSIA GAMMA*, ETC., AT OSTEND.—I have just returned from a short trip to Dover, Margate, and Ramsgate, where the dearth of insects was quite depressing. I was, however, agreeably surprised and very much astonished at witnessing the contrast presented on my arrival at Ostend. I never saw such a sight; to say there were millions of insects might be an exaggeration, but to say there were hundreds of thousands of *Plusia gamma* would not be. These were in shoals everywhere, but principally on a patch of clover near the Kursaal, and at night round the electric light near the casino on the parade. *Pyramis cardui* was flitting by hundreds up and down the streets, and on the barren sandhills where there is not a stick of anything green, but the great rendezvous seemed to be on a large solitary thistle beside the quay, where the slimy water is so deliciously (?)

perfumed which may have been part of the attraction. On this thistle was a mass, as close as they could pack themselves, of *P. cardui*, *P. gamma*, and several other Noctuæ and Crambites whose names I cannot be certain of. I saw only one *Vanessa polychloros* and a suspicious-looking dark butterfly very like *V. Antiopa*; however, I cannot say for certain, for I took no entomological apparatus with me.—H. RAMSAY COX; Thornleigh, Forest Hill, S.E., August 20, 1879.

BOLETOBIA FULIGINARIA IN THAMES STREET, LONDON.—I have the pleasure to inform you that one of our men has just brought to me a specimen of *Boletobia fuliginaria* which he had taken on our wharf. It is a female, but unfortunately, in getting it into a box, he did a little damage to the right upper wing; in other respects it is perfect in condition. This is the second specimen that has been taken on the same premises, for, in the same place, my friend Mr. Mallett took a male about twenty years ago.—J. R. WELLMAN; 14, Portland Place North, Clapham Road.

EUPITHECIA EXPALLIDATA.—*Eupithecia expallidata* has been unusually abundant here this season. On Thursday last, twelve were boxed in about half an hour, just before dark. The males were worn, but most of the females were in good condition.—[Rev.] O. P. CAMBRIDGE; Bloxworth Rectory, August 18th, 1879.

SPILODES PALEALIS AT BOX HILL.—Whilst collecting at the above locality on August 10th, I had the pleasure of taking three fine *S. palealis*. I was also fortunate in breeding the yellow form of *Zygæna filipendulæ* from pupæ collected on the Hill.—A. W. PRIEST; 16A, Merton Road, Stanford Road, Kensington, August 18, 1879.

SCOPARIA BASISTRIGALIS, ETC., NEAR DONCASTER.—Whilst collecting with Mr. Wm. Prest, of York, in Edlington Wood, near Doncaster, on Bank Holiday, August 4th, we came on a colony of *Scoparia basistrigalis*. It occurred in great abundance in an area of, perhaps, a hundred yards square, more than a dozen specimens frequently being found on the trunk of a single large tree. We also took fine larvæ of *Notodonta chaonia* crawling up the trunks of the oaks on the same ground. Other species taken by us, and other members of the Yorkshire Naturalists' Union (which had an excursion there that day), either larvæ or imagos, included *Thecla W-Album*, *Phorodesma bajularia*,

Ennomos fuscantaria, *Timandra amataria*, *Scotosia retulata*, *Anticlea rubidata*, *Ebulea crocealis*, *Scoparia cratægalis*, and many others. As showing the extraordinary character of the season, *Abraxas ulmata* was still out commonly, and in good condition; and *Melanthia albicillata* was by no means over.—GEORGE T. PORRITT; Highroyd House, Huddersfield, August 12, 1879.

ACIDALIA HERBARIATA.—A lovely specimen of this curiously-rare species was exhibited at the last meeting of the West London Entomological Society, by Mr. Coverdale. It was found at rest upon a door-post in Cannon Street, in the City of London, on 22nd July last. The specimen is in beautiful condition; in fact, fine as though only just emerged from its pupa.—E. G. MEEK; 56, Brompton Road, S.W., August 10, 1879.

ARTICLEA BERBERATA DOUBLE-BROODED.—Some larvæ which I had, fed up and went into pupæ, and, thinking they would remain so until next spring, I placed the cage in a cold cellar; but on examining them I was surprised to find that the whole of the moths had appeared.—F. O. STANDISH; 8, St. Paul's Terrace, Cheltenham, July 19, 1879.

ABUNDANCE OF EMMELESIA DECOLORATA.—Whilst walking down a lane, near Leyton, leading to Hackney Marshes, the other evening (July 18th), I was surprised at the great abundance of *Emmelesia decolorata*. I had only a few boxes with me, and therefore took about half a dozen specimens, but could, if I had had a net with me, have taken a hundred. Never having heard of this species occurring in such numbers before, I thought it might possibly be of interest to readers of the 'Entomologist.'—A. THURNALL; Stratford, July 21, 1879.

ANCHOCELIS LITURA.—As Mr. E. A. Fitch is in doubt respecting the time for the egg of this species to hatch, I may state that a female specimen taken at ivy blossom last October deposited eggs which hatched early in April. The larvæ did well on whitethorn, but are a considerable time before changing to pupæ, remaining in a torpid state until their transformation.—F. O. STANDISH; 8, St. Paul's Terrace, Cheltenham, July 19, 1879.

NOTES ON THE SEASON NEAR WOODCHESTER.—My experience of this season is that not a single specimen will come to sugar

here, but at light a larger number come than at any time during the last few years. I have recently taken *Iodis vernaria*, *Cucullia lychnitis*, *Notodonta camolina*, *Selenia illustraria*, and *Dianthæcia conspersa*; and such things as *Chelonia caxa*, *Boarmia repandata*, *Bryophila perla*, *Lithosia complanula*, *Liparis salicis*, *L. auriflua*, *Selenia illunaria*, and many of the common Noctuæ, have come absolutely in dozens; but why a *Pieris napi* should be keeping such late hours it would be hard to surmise. Next week I am going to visit some privet in bloom in Woodchester Park, about a mile from here, and there perhaps I may discover the reason of the absence of insects from the sugar.—[Rev.] H. S. B. GATES, O.P.; Dominican Priory, Woodchester.

CAPTURES IN SUTHERLANDSHIRE.—In September and October, 1877, I was for some time at Balblair, in Sutherlandshire, and among the Coleoptera there taken by me was a *Cicindela* in the larval state. I dug it out of its burrow, one of several, in the sandy edge of a moor above the Shin River, from which the moor is separated by the road to the falls. I tried to rear the larva, but failed; so I can only guess it to be that of *C. campestris*. I have it now preserved in spirits. Can any reader tell me if *Cicindela* has been previously, or since, recorded so far north? Among other coleopterous captures was a specimen of *Staphylinus stercorarius*, taken out of a patch of horse-dung which was absolutely heaving with continually changing thousands of *Aphodius contaminatus*. *Dromius quadrimaculatus* occurred at sugar; *Harpalus ruficornis* and *Otiorhynchus sulcatus* under stones; *Lema cyanella*, and what I take to be *Prasocuris aucta*, by sweeping. The Lepidoptera, particularly the Geometers, were very abundant. Among the Diurni *Argynnis Aglaia* was pretty well represented; and the females of little *Lycæna Alexis* were the finest I have ever seen. Being unable to sugar more than twice I took very few Noctuæ, but among the few a fine melanic *Xylophasia polyodon* (at sugar). *Charæas graminis* was very common by day on yellow ragweed; and on September 8th I found two females on grass in the act of oviposition. *Polia chi* was only just coming out, but three specimens were taken resting on the northern side of tree trunks by day. On September 8th and 11th I took on broom a number of the larvæ and one or two pupæ of *Orgyia antiqua*. The larvæ were most of them nearly full-fed; and such as attained the pupa state at all did so in the

course of ten days. The perfect insects began to appear in about eighteen days, and the females at once commenced to deposit their eggs. Is *Antiqua* commonly found on the broom? This plant is not given in Owen Wilson's list of food-plants. Has *Antiqua* been recorded from Sutherlandshire before?—L. DUFF DUNBAR; Ackergill Tower, Wick, N. B., July 8, 1879.

[In the "Insecta Scotica," as published in the 'Scottish Naturalist,' Dr. Buchanan White records *Orgyia antiqua* as a certain inhabitant of his Moray district, and probably of Sutherland. It is exactly the same case with *C. campestris* in Dr. Sharp's list of Coleoptera. Last June I found the latter insect very abundant at Braemar, at an elevation of about 1400 feet. The larva of *O. antiqua* has been found commonly on many of the Scotch moors, generally feeding on the heather, but occasionally on *Vaccinium*. The fact of such a polyphagous larva feeding on broom cannot by any means be considered unprecedented.—E. A. F.]

THE WEATHER, AND ITS EFFECTS ON LEPIDOPTERA.—I can quite corroborate Mr. J. Jenner Weir's interesting note on this subject (Entom. xii. 179). In the district where I at present reside (Hornsey) up to the present time both plants and insects have been unusually retarded in their development by the long-continued winter and cheerless spring and summer through which we have so far passed. I have kept a rough daily record as to the state of the weather and the occurrence of Lepidoptera, and beg to offer from it the following notes. At present a casual visitor would imagine that insect-life was all but extirpated here, for I have only seen the commonest species, and but few specimens of them. If I recollect rightly 1875 was not a forward year at first; but, on the 17th May, the oaks at Lyndhurst were advanced enough to supply food for the larvæ of *Himera pennaria* and other common species which do not hatch till the spring, and which were then over an inch long; and the *Pieridæ* were out before the 12th of May. This year the oaks did not assume a green tint till the 26th of May. I observed the first *Pieris brassicae* sunning itself on the banks of the cutting through which the Great Northern Railway approaches Hornsey Station, on the 10th of June. I saw the first hawthorn blossom on the 5th of June. Last year, in spite of the early part of the summer being anything but brilliant, I found *Cænonympha Pamphilus*, and

Lycæna Icarus just out and not scarce near Southend on June 18th, and *Satyrus Janira* on the 20th; and on the 23rd *Vanessa Atalanta* and *V. urticæ* were just beginning to emerge from the pupa. This year I have, up to this date, only seen *Pieris brassicæ* and *P. rapæ* or *P. napi* about Hornsey; the largest number I observed being nine on June 13th. An evening's sugaring in one of the Surrey woods, on June 24th (a mild damp evening), produced nothing. The only Lepidoptera seen, excepting a *Noctua* on the wing, not netted, being *Geometræ*, mostly in fine condition, which are usually out before the end of May. From my diary it would appear that since June 1st there have been twenty-one days more or less sunny, only two being really brilliant, and sixteen on which it has rained, seven of which were very wet.—B. LOCKYER; 27, King Street, Covent Garden, July 2, 1879.

THE WEATHER, AND ITS EFFECTS ON LEPIDOPTERA.—In the 'Entomologist' for July (Entom. xii. 179) I observe that Mr. J. Jenner Weir has written upon the above subject, and asks for further notes with reference to the same. In reply to his desire will you allow me to record the dates of three captures I have made in our locality, which tend to prove the late appearance of our March and April Lepidoptera. On May 31st I took a fresh *Tæniocampa cruda*; on June 8th I found on some railings a *Cucullia chamomillæ*; and five days later I caught a *Hemerophila abruptaria* in good condition; while in the middle of May the gas-lamps were frequented by *Hybernia progemmaria*, *Tæniocampa instabilis*, and other contemporary things. Thus we see some of the results of a cold spring upon insect life; but although the summer so far as it has gone has been fully in character with this year's spring weather, yet I must admit that the "sugar" is now producing only such species as we have a right to expect during the month of July.—H. T. DOBSON, jun.; New Malden, Surrey.

PARTHENOGENESIS IN A MOTH.—As previous to this year I was unaware of parthenogenesis among the Lepidoptera, I send you this note, thinking the subject may prove as interesting to others as it is to myself. Last summer I fed up about a dozen larvæ of *Liparis dispar*, three of which I gave to a friend, and they all emerged as males; the first of my own to come out was a male, which I immediately killed. After this I kept three

females, wishing to secure eggs, but as no other male made its appearance I was disappointed, although the moths I was keeping laid batches of eggs, two of which I threw away, thinking, of course, that they were infertile; and the other batch would have shared a like fate had it not been deposited upon the side of a box in which I had other pupæ. Judge of my surprise when, on May 6th, I found that larvæ were emerging therefrom, and these identical larvæ are still feeding. As I kept the pupæ in a securely-fastened box with a glass lid, no male could have had access. I shall be curious to see if this power of reproduction will extend to the next generation.—W. G. PEARCE; Bath.

[Parthenogenesis in the Lepidoptera is by no means infrequent—many species have been recorded as producing second broods without the immediate fertilisation of a male; in the family *Psychidæ* it very frequently happens.—ED.]

PENTODON PUNCTATUS, *Villa.*, IN SPITALFIELDS MARKET.—In the June number of the 'Entomologist' (Entom. xii., 158), I had the pleasure of recording the capture of *Carabus auratus* in the Borough Market. I have again pleasure in recording another interesting capture, and this time of a beetle not indigenous to Britain, Spitalfields Market being the haunt of our new friend: on the 10th June last I had brought to me by a friend, who is a salesman in the market, a fine specimen of the above-named insect; it was found by him sauntering leisurely over a sieve of cherries, although I do not suppose it was revelling in the luxury of the fruit. I need scarcely say the cherries were Continental, having been sent from the South of France. I can find no record of this insect having been taken in Britain before, so I thought this capture might interest many of your entomological readers. It probably does to many seem strange that such insects as *Carabus auratus* and *Pentodon punctatus* should occur in our London markets; but my little experience leads me to think that if entomologists generally were to make friends amongst the many salesmen in the markets, we should not unfrequently have records of many interesting captures, and probably, occasionally, some few varieties; for instance, *Pentodon punctatus*, which is a native of the South of Europe.—T. R. BILLUPS; 4, Swiss Villas, Coplestone Road, Peckham, August 14, 1879.

GOOSEBERRY AND CURRANT BUSHES ATTACKED BY LARVÆ.

—Many of the gooseberry and currant bushes in this neighbourhood have this year been almost stripped of their foliage by immense numbers of those little pests, the larvæ of *Nematus Ribesii*. A short time ago I had a box of these larvæ brought to me, which I fed up, and this day (July 12th) several of these sawflies have emerged. Can any entomologist suggest any means whereby we may withstand their attacks should they assail us in the future?—R. LADDIMAN; Norwich, July 5, 1879.

INJURIOUS INSECTS.—The whole of the gooseberry and currant bushes in this neighbourhood are entirely denuded of leaves by the larvæ of a sawfly; they are here in countless thousands; the bushes are dreadful objects, not a vestige of green left on them, but plenty of fruit. Other pests are abundant, but partial; but the gooseberry grubs are everywhere.—V. R. PERKINS; The Brands, Wotton-under-Edge, August 8, 1879.

PARASITES OF THE CELERY FLY.—At folio 141 of his 'British Entomology' Curtis says of *Alysia Apii*:—"For specimens of this insect and their history I am indebted to a lady who found the larvæ feeding upon the parenchyma of celery leaves the 30th September; on the 11th October they had changed to shining oval pupæ of a dull ochre colour, having very much the appearance of a shell (*Turbo Chrysalis* of Turton); the imago appeared the June following." Amongst the addenda to this fine work he, however, expresses a doubt whether the shell-like pupæ did not belong to a *Tephritis*, and that the *Alysia* was its parasite; subsequently the matter was so, correctly, stated in his paper in the 'Journal of the Royal Agricultural Society' (vol. ix., p. 192, August, 1848), and again in 'Farm Insects.' There he goes further, for speaking of the beautiful and peculiar Chalcid, *Pachylarthrus smaragdinus*, Curt., he says:—"Whether the *Pachylarthrus* is a direct parasite, and punctures the larva of the *Tephritis*, or lays its eggs in the pupæ already occupied by the *Alysia*, which in all probability is the case, has not been ascertained." This spring, in breeding this pretty fly (*Tephritis onopordinis*), whose larvæ were so destructive to our celery crops last year, I have met with several specimens of *Pachylarthrus smaragdinus*. This insect is excellently figured on Plate 427 of 'Brit. Ent.' under the name of *Phagonia smaragdina*.

It is a beautiful green Chalcid, with the anterior joint of the maxillary palpi extraordinarily developed in the male; and this, like the antennæ and legs, being bright orange in colour, is especially noticeable. Not having met with a single *Alysia*, and on opening the pupæ finding no trace of the ichneumon occupant, I think Curtis's surmise cannot be established, and have but little doubt that the *Pachylarthrus* is a direct parasite of the *Tephritis*. In no case was there more than one parasite in a pupa.—EDWARD A. FITCH; Maldon, Essex.

OBITUARY.

SIR THOMAS MONCREIFFE, Bart.—It is with much regret that we record the death of Sir Thomas Moncreiffe, which took place on August 16th, after a short illness, the cause of death being exhaustion ensuing upon a very painful operation. The deceased was in his 57th year. A keen sportsman and an accurate observer of Nature, it is only about ten years since Sir Thomas turned his attention to Entomology. In this branch of science he chiefly confined himself to the Lepidoptera of Perthshire, to the study of which he devoted all the time not necessarily occupied by his private and public duties. Though his field of observation was in great measure confined to Perthshire, Sir Thomas was no mere collector, but a scientific entomologist of broad views, and those who had the pleasure of being associated with him, either personally or by correspondence, know what a keen eye he possessed for the distinction between species, and how enthusiastic he was in the study of the habits of his favourites. He was a frequent contributor to the pages of the 'Scottish Naturalist,' amongst his last communications being a list of the Lepidoptera he had observed on Moncreiffe Hill, including upwards of six hundred species, and many of great interest and value as throwing light upon the geographical distribution of the species. Sir Thomas was president of the Perthshire Society of Natural Science for several years, and did much to promote the study of Natural History in Perthshire. With all classes he was extremely popular, while his genial and kindly nature endeared him to everyone who knew him.—F. B. W.

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LOCALITIES FOR BEGINNERS.

No. IV.—LOUGHTON.

By JOHN T. CARRINGTON.

HAD it not been for the agitation commenced in this magazine by the East London Entomologists, which gradually spread to others interested in Epping Forest, the Corporation of London would not have now been owners and trustees, for the public, of Epping Forest. The manor of Loughton forms a considerable portion of what now remains of the Forest. This district has always been a favourite one for the London entomologists; and no wonder, for within easy reach of the Londoner are many hundred acres of woods, forming a fine collecting ground for insects, with a large variety of species, especially of Lepidoptera.

The majority of Epping Forest is on the London Clay, which near High Beech reaches its greatest altitude. But here and there are large patches of the lower Bagshot sands. High Beech stands on one of these patches, which there extends from a little north of the King's Oak Inn to south of the new church.

There are two convenient ways of reaching the Loughton portion of Epping Forest. The first is by rail from Liverpool Street or Fenchurch Street Station to Loughton Station, a return day-ticket costing only a shilling. The second route is by railway also from Liverpool Street Station to Chingford. In each case the journey occupies about forty-five minutes.

Loughton Station is close to the Forest. Strolling past the Crown Hotel, nearly opposite we see Snakes Lane, leading into the Forest. Arrived there, those who visit this part of Essex, for the first time, cannot fail to be struck with the curious appearance of the trees. Years upon years of "lopping and topping," one of the hardly contested rights of certain commoners, have caused

them to grow rather into thick bushes upon tree trunks than into the wide-spreading shady trees of other counties. I often hear my entomological friends complain of the practice of lopping, but although it adds nothing to the beauty of the scene, I think it very convenient for the collector. He can the more easily beat for larvæ or imagines, for in most instances the highest branches are within reach. This kind of growth may also to some extent account for the very extensive insect fauna of Loughton. These trees consist of beech (*Fagus sylvatica*), of hornbeam (*Carpinus betulus*), which are in decided majority; still there are many other species, such as oak (*Quercus robur*), birch (*Betula alba*), and alder (*Alnus glutinosa*). Amongst the undergrowth are scrubby examples of most of the foregoing, with honeysuckle (*Lonicera*), various willows, and salallows (*Salix*). Plenty of heather (*Calluna vulgaris*), dwarf whin (*Genista anglica*), &c.

Arrived within the Forest by way of Snakes Lane, we leave the road and bear along a little path to the right, shortly crossing a new road now being cleared. From this point we see below us a valley with a little stream at the bottom, which is a small tributary of the River Roding. Keeping up this stream brings us to a piece of nice flat marshy ground. This is Debden Slade, and is well known to the older collectors. At sugar on the trees by the side of this little patch *Noctua rhomboidea* occurs in some seasons quite commonly. Many rare Lepidoptera have been taken just in this neighbourhood, which should be tried at all times of the year. On the sloping bank to the south may be found in their respective seasons larvæ and imagines of *Limacodes asellus*, sometimes even abundantly. This bank is also the head-quarters, and I believe the only known locality, for *Stigmonota leguminana*, generally to be taken as a unit in a day's collecting, although odd lucky catches have been made by those who have carefully studied its habits. *Stigmonota Weirana* is also here, as well as in other parts of the Forest, amongst beech, and *S. puncticostana* should be sought for; all of them species much wanted in collections, and well worth taking. If the micro-lepidopterist wishes for a treat he may have one in May and early June in capturing the lovely little *Stigmonota internana*, which is to be seen flitting over the furze (*Ulex europæus*) bushes and in the sunshine looking like little snow-flakes. The white

underwings give them the snowy appearance that readily separates them from the very abundant *Catoptria ulicetana*, which flies over the same bushes not only then, but during the whole summer. *Chrosis Audoinana* is here also in June, and is always a prize.

Following this valley will bring us to the High Beech Road, close to the Robin Hood Inn. Here are four roads meeting. We can turn to the right, which takes us towards the Wake Arms Inn. On both sides are many sallow bushes, where in olden times Mr. Doubleday used to get the purple emperor (*Apatura Iris*) flying over them, but it is now many years since one was seen. About half-way up this road we scramble up the high bank to the right, and a short walk brings us to Little and Great Monk Woods. In these the whole scene changes, and we are amongst the unlopped portion of the Forest. The trees stand in striking contrast to their stunted neighbours, and in hot weather afford a delicious retreat from the other and less-shaded parts of the Forest. *L. asellus* is often common amongst the beeches here, while *Ephyra trilinearia* is in abundance. As I have just stated, I think lopping is in the collector's favour, for, excepting these two species, little else occurs in sufficient quantity to keep us long amongst these tall trees unless it is to pick up an odd *Stauropus fagi* resting on a beech tree trunk, or in July *Liparis monacha* setting in the same manner on the oaks.

Returning by the way we came brings us back to the road, which we cross, and work in the opposite direction. Following on we come to the King's Oak, High Beech. If this is in June we should especially search the marshy hollow behind the Inn, for amongst the scrub beneath the trees was first found *Erastria venustula*, for long so rare, but which has latterly been more frequently taken here and in other parts of the Forest by beating the low bushes and by looking for it at dusk when its short flight occurs. This hollow is apparently its head-quarters, where the larva is said to feed on cinquefoil (*Potentilla tormentilla*).

While refreshing ourselves at the King's Oak Inn we have, on a fine day, one of the finest views in the London district. From one side of the house one may see far away over Hertfordshire, past the tall chimneys of the celebrated gun-factory at Enfield. On the other side the vista closes with the Kentish Hills beyond Gravesend, the fine breadth of undulating

woods intervening. Crossing the road opposite the Inn, we walk over a lawn of fine grass down to a little hollow. Here occurs *Lycæna Egon* and *Procris statice*: a series of each may soon be taken. On the beech trees near here, feeding on the hard fungus so often found on the decayed parts, will be seen the traces of the larvæ of *Scardia chorargella*.

Working our way past the new church we come down, after a long stroll, to Fairmead Bottom, another nice marshy bit of meadow surrounded by trees, but much more extensive than the Debden Slade. Here, as well as in other parts of the Forest, in early spring is to be found at night, resting on the flowers of blackthorn (*Prunus communis*), the imagines of *Aleucis pictaria*. At the westerly end of this little marsh we come out at Leppitt's Lane, a few yards up which is the Owl Inn, where Mr. Lane, the proprietor, has always a hearty welcome for the entomologist, and will tell him how, during many a long season, he has ministered to the comfort of the weary flycatchers who have more than once been in such numbers as to sorely tax his resources. Returning to the Fairmead we should look for *Macroglossa fuciformis* and *Crambus pinetellus* in June, the former flying like a humble bee in the sunshine. *Corycia temerata*, *Lithosia aureola*, and *Numeria pulcherrima* are also there. During the whole season something or other will turn up to reward the diligent collector about Fairmead Bottom. Working away southwards we come to Queen Elizabeth's Lodge: originally used as a hunting lodge, but now a refreshment-house. In this latter stroll we again come upon some more fine uncropped trees, where, for some reason, lopping has not been practised. From here to Chingford Railway Station is but a few minutes' walk.

The very pleasant walk of some three miles I have just described, extending from Loughton to Chingford, is only one of many which may be taken in this portion of Epping Forest,—where at all times of the entomological season there is much to be done by the lepidopterist. Now that the autumn months have commenced, and October and November are approaching, there is a very ample field for the student amongst the larvæ of the leaf-mining *Tineina*. At another page of this number of the 'Entomologist' will be found an interesting account by Mr. Elisha of his experience in forcing *Tineina* during the winter months, thus saving much valuable time when the insects would naturally

appear, and many others occupy our attention. The genera *Lithocolletis* and *Nepticula* are especially amenable to forcing.

Amongst the many autumnal larvæ which may be taken at Loughton are *Stauropus fagi*, which has not been uncommon this season; *Notodonta chaonia* and *N. dodonæa*, from oak; *Demas coryli*, from beech; *Eurymene dolabraria*, also from oak; while beech and hornbeam produce *Limacoides asellus* and *Ephyra trilinearia*, the latter in abundance. In May the curious larva of *Phorodesma bajularia* is found on oak, looking more like a caddis-fly case than that of a decent lepidopteron, being dressed in ragged bits of sticks and leaves. The imago flies at the end of June a little before dusk, but always high. A good plan is to throw up a sod of grass when one is seen, and it will often come down sufficiently low to be reached with the net.

Amongst Diurni, as I have already said, *Apatura Iris* used to be taken. *Thecla betule* and *T. quercus* are frequent, as are *Argynnis Paphia* and *A. Adippe*, while many others are common, especially *Lycæna Argiolus*, wherever hollies occur.

The second known example of the very rare *Sophronia emortualis* was taken by Mr. Charles Healy behind the King's Oak at High Beech. Another great rarity since taken at Loughton was *Eupithecia egenaria*, the example being now in the collection of Dr. Battershell Gill. There is no saying that these may not some day be again found, for was not *Erastria venustula* a lost species for many years? It does not follow because a collector has for seasons visited a locality that he knows all about it. In fact, that very feeling is a source of danger to the entomologist, and makes him careless and so miss many a good species.

Loughton has been worked by entomologists for many years, probably longer and better than any other district in England; but he would be a brave man who would say there is nothing new to be taken in those pleasant woods.

I have to thank Mr. E. G. Meek for showing me, with his usual kindness, the localities of the more local Lepidoptera at Loughton, and telling me of many others.

Royal Aquarium, Westminster, S.W., September, 1879.

A WINTER OCCUPATION FOR LEPIDOPTERISTS.

By GEORGE ELISHA.

As the time is now approaching for collecting the various species of the leaf-mining genera, *Lithocolletis* and *Nepticula*, in the larval state, viz., October and November, perhaps a short description of a forcing apparatus I successfully tried during the early part of this year may be useful and new to some of the readers of the 'Entomologist.' It is a great advantage to be able to breed these minute insects at a time of year when there is scarcely anything else to be done entomologically, and to get them all out, well set, and in the cabinet some weeks before the natural time of their appearance. In the month of May, when species begin crowding upon us, it is almost impossible to spare the necessary time to set these species in any quantity, and as carefully as they should be. The consequence is, they are apt to become neglected, and possibly cause the collector to give up studying the *Tineina*—that most interesting portion of the Lepidoptera.

My apparatus consists simply of a box, ten inches square and six inches deep, open at the top and lined with thin zinc. A zinc tray is made to fit the top, one inch and a half deep, to contain damp sand. Underneath on the tray is soldered a much smaller tray, an inch deep, which forms the boiler; a short piece of pipe is soldered in the upper tray, through which to fill the boiler. The tray is then put on the box,—the edges being made larger prevents its falling through,—and underneath is placed a spirit lamp, or jet of gas, the flame being barely a quarter of an inch long, which is quite sufficient to give a great and regular heat. A square hole is cut in the side of the box in front, to put the hand through to regulate the light, and on the opposite side, just underneath the tray, a few holes are drilled in the box for ventilation, or the light will go out. Above the tray, and resting on the damp sand, is a square zinc glazed case, eight inches high; the top square of glass is loose to lift out, for placing the bottles or glass jars in containing the pupæ, and also to regulate the heat. When all is ready, fill the boiler nearly to the top with water. Then fill the trap with damp sand to give a moist atmosphere, and put on the glazed case. After which, put in the jars containing the leaves mined by the larvæ, and in the

centre suspend a small thermometer, and light the gas or lamp, which can be regulated with ease to keep the heat up to between 60 and 70 degrees Fahr. It is then no further trouble, and will well repay anyone for the little time spent in getting it in order.

During last February and March I bred without any difficulty a long series of the following *Lithocolletidæ* in fine condition, and some of them unusually large specimens, viz.:—*L. spinicolella*, *L. faginella*, *L. corylella*, *L. salicicolella*, *L. carpinicolella*, *L. tenella*, *L. ulmifoliella*, *L. tristrigella*, *L. emberizæpennella*, *L. Nicelliella*, *L. Schreberella*, *L. lantanella*, &c. The last-named insect being a hybernating larva, I had a doubt about it, so tried a few; but found in about five days they had changed to the pupa state, and in the following week the imagos appeared. I think a great deal might be done with small hybernating larvæ among the *Tineina*, generally so very difficult to rear successfully. I also bred *Cosmopteryx Lienigiella* and *C. Drurella*; also many species of *Nepticulidæ* quite three months before their usual time. Ample amusement and instruction may be obtained during the dull season by thus breeding most of the *Tineina* that appear in May, and leave one at liberty in that busy month to look after other species.

Shepherdess Walk, City Road, N.

THE TORTRICES OF SURREY, KENT, AND SUSSEX.

By WALTER P. WESTON.

(Continued from p. 188.)

Peronea sponsana, Fab. = *favillaceana*, Hub.—Generally distributed, but not very abundant; the larvæ may be found in July and August in rolled-up leaves of birch, beech, and sallow. The imago appears in the autumn, and may easily be obtained in the day-time by beating; it also comes to light and sugar, and is a frequent visitor to ivy-bloom.

P. autumnana, Hub. = *rufana*, Schiff.—Mr. Stainton gives Wimbledon Common, Surrey, as a locality for this species, but, as far as I am aware, it has not occurred there of late years; possibly the alterations, draining, &c., which have taken place on the common have had something to do with its disappearance. It is a late autumn species, and on one or two occasions has been

taken tolerably plentifully by fumigating. The larva feeds on *Salix fusca*, the dwarf willow, poplar (*Populus*), *Myrica Gale*, &c. It has also occurred in Kent,—at Birch Wood and near Dover. Notwithstanding the opinions of several entomologists to the contrary, I am inclined to believe that *P. Lipsiana* is only a northern variety or local form of this insect, and hope very shortly the life-history of the two species—for so they must be at present considered—will be completely elucidated.

P. mixtana, Hub.—This species may be looked for on moors and heathy places. The imago appears in September and October, and is more often met with in the spring, after hibernation. In places where the heather is tall, and can easily be worked, fumigating should also be attempted for this insect. It has occurred at Wimbledon and Shirley Heath (Surrey); in Sussex, at Lewes, and a single specimen is mentioned in the Rev. E. N. Bloomfield's list of Hastings and neighbourhood. In Kent it is sure to be met with on the moorland to the west of Tunbridge Wells.

P. comparana, Hub.—Generally distributed.

P. Schalleriana, Linn.—Generally distributed. I have met with this insect very abundantly some seasons near Folkestone, and a few of the variety *Latifasciana*, Haw., have been taken in the same locality. It appears scarce at Hastings, but it will probably be found when worked for.

P. Caledoniana, Bent. MS.—Occurs not uncommonly in the north of Kent, but is a scarce and local species in the South of England.

P. permutana, Dup.—Formerly used to occur commonly in Surrey, on Barnes Common, among *Rosa spinosissima* in August and September, but I am not aware of any recent captures, and fear it is no longer to be met with in its old haunts; indeed I have been informed that its food-plant is getting very scarce, and there is some fear of *Rosa spinosissima* following the example of other botanical rarities on the Common, and disappearing altogether.

P. variegana, Schiff.—Common everywhere.

P. cristana, Fab.—Scarce and local. The imago appears from August till November, and hibernated specimens are occasionally met with in the spring. The larva feeds in rolled-up leaves of hawthorn, usually preferring old and mossy trees.

A few years ago I took some numbers in Folkestone Warren, including a few of the variety *Subcapucina*, but have not met with it there lately. It also occurs at Birch, Darenth, Greenhithe Coombe, and West Wickham Woods. I know of no Sussex locality.

P. Hastiana, Linn.—Far more common than the preceding species, and generally distributed; the larva feeds in the terminal shoots of various species of sallow in July and August, the imago appearing in September and October. Wilkinson says a second brood appears in May, but these are probably only hybernated specimens from the autumn brood.

P. umbrana, Hub.—This is another insect that we appear to have lost sight of lately. It appears confined to Surrey and Sussex, the localities given being Sanderstead and Mickleham, and a single specimen recorded by Mr. Verrall from the neighbourhood of Lewes. The moth should be looked for in September and October, and occurs chiefly among blackthorn and whitethorn.

P. ferrugana, Treit.—Distributed throughout, occurring commonly among birch and hornbeam. The imago, which varies greatly in its colour and markings, appears from July till November, and is also common in the spring, after hybernation, when the specimens are generally in good condition.

P. tristana, Hub.—Not uncommon where its food-plant, *Viburnum Lantana*, grows, and is more readily bred than captured. The larva is full-fed in August, the moth appearing in September and following months. In Kent it has occurred at Darenth, Greenhithe and Birch Woods; at Pashley, Lewes, and Hastings, in Sussex; and in Surrey at Wimbledon, Mickleham, Sanderstead, and Croydon.

P. aspersana, Hub.—Common on all chalky downs wherever its food-plants, *Spiræa filipendula* (dropwort) and *Poterium sanguisorba* (lesser burnet) occur.

Teras caudana, Fabr.—Widely distributed throughout during the autumn months, and sometimes commonly. At Folkestone I once met with this insect in unusual abundance and in every variety of colour from dusty to nearly black. The varieties *ochracea*, *emargana*, and *excavana*, described by Wilkinson, were tolerably common, as was also another having the ground colour of the fore wings dark red with markings indistinct; and of a dark brown colour.

- T. contaminana*, Hub.—Abundant everywhere.
Dictyopteryx Leflingiana, Linn.—Abundant everywhere.
D. Holmiana, Linn.—Abundant in all hawthorn hedges.
D. Bergmanniana, Linn.—Abundant among rose-bushes.
D. Forskalcana, Linn.—Common everywhere among maple.
Argyrotoza Conwayana, Fab.—Distributed throughout, and not uncommon among privet bushes and hedges.

(To be continued.)

ECONOMIC ENTOMOLOGY.

By STEPHEN FITZWILLIAM.

(Concluded from p. 201.)

BELGIUM also has found the need of legislation to compel the destruction of insects. Rewards were formerly given, but it has been found requisite to resort to compulsion. I have not the Belgian code at hand to refer to, but I believe it is left to an *arrête royale* to direct from time to time the measures to be taken.

In considering the results of experiences of other nations, and comparing compulsory action with action for rewards, it will not be forgotten that, eleven years ago, the Central Agricultural Society of Saxony made efforts to secure united action among landowners, and urged the magistrates to assist in getting the insects collected. The influence of the society was sufficiently great to secure large numbers being destroyed. This, however, seems to have been a result to be regarded as an exception rather than a rule, and the united action was the more readily obtained since the year was an exceptionally bad one as to damage from cockchafers.

America, too, has found the need of legislation in some States,* instead of relying on bounties only. There the ravages are on so gigantic a scale, and inventions and arrangements for destroying locusts are kept so prominently before the public, that it might be readily imagined that the need for voluntary united

* The laws are given in full in the report of the State Entomologist for Missouri, 1877, and in the report of the United States Entomological Commission. The French laws I referred to at greater length because the information is not so accessible, as a fire at the office destroyed nearly all the copies of the 'Journal Officiel,' from which I have quoted.

action would have been recognised. But experience has shown compulsion is requisite.

While France, perhaps more than any other country, has sought to spread a knowledge of practical Entomology through its schools in agricultural districts, America has, more than any any other country, taken the very practical step of appointing a Commission to collect data on insect ravages. England, even with its vast agricultural interests at stake, alone seems indifferent and inactive. Switzerland, Belgium, and Germany do more than we do. France, through its *Société centrale d'Apiculture*, has encouraged the study of Economic Entomology in its elementary schools to an extent that would astonish many an experienced English school inspector. The *société* gives prizes for the best drawings, on enlarged scale, of familiar farm and garden insects. In some cases, these are from the pupils' own dissections; in others they are but copies. No doubt the specimens of drawings, which are exhibited from time to time, are the pick of the work, just as our Science and Art Department shows only the pick of the work of the young art students. Granting this, it still proves France is in advance of England with regard to the spread of a study of Economic Entomology.

The example set by America in collecting information is well worth consideration. A Commission was appointed, and funds were voted; and the energetic way in which the Commission set about its work was worthy of the trust committed to it.

The Commission, consisting of three skilled entomologists, was authorized by Act of Congress (approved March 3rd, 1877) to report upon the depredations of the Rocky Mountain locusts in the Western States and Territories, and the best practicable method of preventing their recurrence or guarding against their invasion; and was attached to the United States Geological and Geographical Survey of the Territories under charge of Dr. F. V. Hayden.

The Commissioners at once began their work upon receiving their appointments.

Several thousand circulars asking for information were sent to persons in the locust areas, and two bulletins in pamphlet form were issued; one containing full information regarding the preventive measures and direct remedies then known against the young locusts, for immediate use by farmers; the second

containing an account of the habits of the locust, so far as then known, with numerous illustrations. The circulars were readily responded to.

The field work was so subdivided as best to promote the end in view. It was carried on from early in April until the early part of November. Every assistance seems to have been gratuitously offered by the officials of the different States, the Post-office, and the railways. The report, of 477 pages, and of 294 closely-printed pages of appendices, shows what an energetic small Commission can do in one seven months in the way of collecting data.

In bringing my remarks to a close I would summarize what seems to me to be the present want in England on the subject of insect-damage:—

- 1st. We want statistics as to what is our annual national loss by insect damage.
- 2nd. We have to decide from these whether it is sufficiently important to demand a united action to deal with it, as has been found requisite in the countries to which I have alluded.
- 3rd. If united action is required, we have to consider whether a society is competent to deal with the subject, or whether it needs Government action.
- 4th. If a society is competent to deal with it, we have to find a society that will take the matter up or to originate one.
- 5th. If it is decided that Government action is needed, there should be drawn up a scheme to submit for consideration.

As I said at the outset I am not an entomologist, but I am glad of this opportunity of endeavouring to draw out the present feeling of those who appeared to be supporting the efforts which Mr. Murray was making.

[I regret that want of opportunity has prevented my learning about the work originated in Exeter by the Misses Ormerod.]

APHIDES.*

By EDWARD A. FITCH.

It was Latreille who divided the Hemiptera into the two sub-orders Heteroptera and Homoptera. The latter includes the Froghoppers (*Cicadidæ*), the cuckoo-spit hoppers (*Cercopidæ*), the ticklers (*Thripidæ*), the leaf-hoppers (*Psyllidæ*), the bark-lice (*Coccidæ*), and the plant-lice (*Aphididæ*).

According to Packard, the homopterous Hemiptera stand the higher in rank, "as the body is more cephalized, the parts of the body more specialized, and in the *Aphidæ*, which top the series, we have a greater sexual differentiation, the females being both sexual and asexual, the latter by a budding process and without the interposition of the male producing immense numbers of young, which feed in colonies." ('Guide to the Study of Insects,' 6th edition, p. 518.)

Aphides, popularly known as plant-lice or smother-flies, abound everywhere and in almost every situation, from the roots of grasses to the topmost leaves of forest trees. There are few to whom they are not known, vulgarly if not scientifically. As Mr. Buckton observes, "Some species of *Aphis* are hardy enough to thrive on the stony heaths of Scotland and Northumberland, whilst others will live almost in the reach of the spray of the sea-shore." I can go further, for I have found *Aphis asteris*, Wlk., living 150 yards away from land on the Essex saltings, which are covered by the tide every day for about eight hours out of the twenty-four. These plant-lice are to be found on every part of the plant; some species affect the roots, others the trunks or twigs of trees and the stems of plants, others the leaves, while some only attack the flower-stalks or flowers, and a few, as the grain *Aphis*, the fruit. There are some few botanical families which are apparently exempt from their attack. Buckton mentions the *Fumariaceæ*, the *Gentianæ*, and the *Irideæ*. Aquatic plants even are not spared, for our beautiful water-lily (*Nymphæa alba*) is often in certain years almost completely annihilated by the attacks of *Rhopalosiphum nymphææ*, and certain other water-plants are commonly infested by other species. Of the very

* Monograph of the British *Aphides*, by George Bowdler Buckton, F.R.S., F.L.S., F.C.S., &c. London: Printed for the Ray Society. Vol. I., 1876. Vol. II., 1879.

numerous leaf species it is remarkable that the walnut-inhabiting *Callipterus juglandicola*, which has occurred so sparingly this year, and the reed-feeding *Hyalopterus arundinis* are the only species known to feed from the upper surface of the leaf.

The effect of *Aphis* attack is often curious and most interesting. Some species cause well-marked galls, as the pine-apple-like fir galls of *Chermes abietis*, the elm-leaf galls produced by *Tetraneura ulmi*, *Schizoneura ulmi*, and *S. lanuginosa*, the poplar leaf-stalk gall of *Pemphigus bursarius*; mugwort leaves are galled by *Cryptosiphum artemisiæ* and stitchwort leaves by *Brachycolus stellaris*. Other species mass together, blister, curl, or otherwise distort the parts attacked in very peculiar fashions, these are numerous, but the curling of our currant-leaves by *Rhopalosiphum ribis* and of our peach and nectarine-leaves by *Aphis amygdali* will serve as familiar examples. The mere mention of such species as the green dolphin or pea-louse (*Siphonophora pisi*), the black dolphin or collier (*Aphis rumicis*), the hop fly (*Phorodon humuli*), the grain or wheat *Aphis* (*Siphonophora granaria*), the apple louse (*Aphis mali*), or the apple-tree louse or American blight (*Schizoneura lanigera*), the green-fly of our greenhouses, or the vine *Phylloxera* (*Phylloxera vastatrix*), is sufficient at once to suggest to the reader what have at times been the effect of a grand attack. The flavour of *Siphonophora lactuæ*, Kalt. (not *Rhopalosiphum lactuæ*, Kalt.) is probably well known to all salad-eaters.

This short sketch calls to mind how worthy our neglected plant-lice are of more extended study than they have yet received; in this country more especially, whether we work from a scientific or a practical standpoint. Leuwenhoek, Réaumur, Bonnet, and De Geer, all gave much attention to these insects. Linné described 33 species in the 'Systema Naturæ,' and since his time, Schrank, Hausmann, Burmeister, Hartig, Kaltenbach, Ratzeburg, and Koch have studied them in Germany; Léon Dufour, Signoret, Balbiani, and Lichtenstein in France; Morren in Belgium; Passerini in Italy; Zetterstedt in Sweden; and Fitch, Shiner, Riley, and others in America; whilst our own country has produced Samouelle, Curtis, Walker, Newport, and Huxley as labourers towards gathering in the abundant harvest of *Aphis* history.

Mr. Buckton now epitomizes these stores of varied information,

and gives us an elaborate 'Monograph of the British Aphides.' The talented author specially declares that it is neither exhaustive nor complete; but be that as it may, its publication, thanks to the Ray Society, gives the entomologists of this country such a basis on which to build, that we hope *Aphis* study will attract more workers than has hitherto been the case.

The observant Shakspeare tells us that it is the imagination of the poet which gives to airy nothing

"A local habitation, and a name."

The omnipresent plant-lice have been treated in a similar way at the hands of various entomological writers; this also in a greatly aggravated form; for probably there is no group in the whole animal kingdom which has suffered more from the assignment of local habitations and names, with very little or no regard to specific differences; than the *Aphididæ*. It became almost an axiom with naturalists that each species of plant had its own peculiar *Aphis*, hence names were inordinately multiplied and the various food-plants of particular species were utterly confused. While this state of things lasted, progress in life-history knowledge was impossible. This obstacle has now been removed, but not until one species of *Aphis* (*Aphis rumicis*, L. = *fabæ*, Curt.) has become possessed of no less than thirty synonyms, and one name (*quercus*, *persicæ*, *salicis*, &c.) given by different authors represents five or six distinct species. When we are assured by Walker that the often-destructive species, which appears in Mr. Buckton's monograph under Schrank's name of *Rhopalosiphum dianthi* feeds on at least sixty known plants, we can easily foresee the difficulties engendered by the application of the old monophagous principle.

The very numerous and very beautiful and accurately-coloured plates which illustrate Mr. Buckton's volumes will guard against this old-established error; the correct determination of a species with these at hand should not be difficult. The first volume contains forty-five plates, the second fifty, and another volume is promised to complete the work. Another great difficulty attending *Aphis* study has been the preservation of specimens, and here again the plates will be most useful. They serve for a typical collection in themselves, more especially when accompanied with microscopic preparations of the winged forms. An improved system of preservation has been lately introduced, similar to that

used in the preservation of lepidopterous and other larvæ, namely, inflation by hot air. It must be stated, however, that the distinctive specific characters of *Aphides* are by no means sharply marked; their size, form, and colour so quickly change according to their degree of maturity, and they are so easily affected by the manner of living, viz., by the ever-changing meteorological or climatal conditions, or by the natural seasonal changes, by variation of food plant, and other surrounding circumstances.

"The cause of this interest may be traced without difficulty to two principal facts. In the first place, the study of these creatures has presented to the embryologist questions for solution of the greatest importance. Phenomena connected with processes of reproduction occur, which, even now, some physiologists consider to be abnormal, and concerning the interpretation of which unqualified consent is by no means accorded. In the second place, the general naturalist has found much to engage his earnest attention, whether he regards the varied life-history of the different species of *Aphides*, their curious habitations, the injuries they inflict on vegetation, or the defences they make against the host of insect foes which attack them on all sides,—attacks which keep within limits an extraordinary fecundity, which otherwise might bring famine into the districts they infest."

So says Mr. Buckton, and the life-history and metamorphosis of an *Aphis* is indeed extraordinary. Even now, these questions of reproduction, the extreme rarity of the males, the distinction of the perfect sexes, oviparism and viviparism, parthenogenesis and metagenesis, their migrations and extraordinary swarms, are far from being satisfactorily settled. The biology of so exceptional a group must be both interesting and instructive to all who are disposed to follow it out. I had intended to have given a sketch of "the cycle of the compound individual," but this article is already long; still before bringing it to a close, the various and beneficent *Aphis* destroyers must be referred to.

These natural limiters act in two ways, from without and from within. The devourers from without are the larvæ of the dipterous *Syrphidæ* (hovering flies), the neuropterous *Hemerobiidæ* (golden-eye or lace-wing flies), and the coleopterous *Coccinellidæ* (ladybirds); these larvæ, happily for vegetation, are all particularly voracious and particularly common. The larvæ of certain *Scymni* also feed upon *Aphides*, and Mr. J. W. Slater has recently proved

the aphidivorous character of the coleopterous *Telephoridæ* (Entom. xi. 163, 255). In one of the late Mr. F. Walker's numerous notes on *Aphides* we read, "The comfrey *Aphis* is the frequent prey of a little red dipterous larva, which seldom attacks other species." (Entom. vi. 27); this was doubtless the larva of the little gall-gnat, *Diplosis aphidimyza*, Rondani. Dr. F. Löw found it preying on the *Aphides* inhabiting seven different plants, so it by no means confines its attacks to one species. We now come to the Hymenoptera; their influence on *Aphis* increase is particularly powerful. Various fossorial *Crabronidæ* store up insects of different orders in their cells as food for their future progeny, these being paralyzed and not killed by the stings of the parent bees; species of the genera *Crabro*, *Stigmus*, *Diodontus*, *Passalæcus*, *Pemphredon*, *Cemonus*, and *Psen* are known to provision their cells with plant-lice, and there are probably others. Marshall's 'Catalogue of the British *Oxyura*' includes 373 species distributed amongst 83 genera; but of their economy we know next to nothing. It is not improbable that many are aphidivorous.

Of the limiters from within—the true parasites—all are hymenopterous, and comprise species of the *Cynipidæ*, the *Ichneumonidæ*, and the *Chalcididæ*. The numerous species of the genus *Allotria* (*Cynipidæ*) complete their metamorphoses within the bodies of the various *Aphides*; they stand at the head of all the internal parasites, being very closely related to the true gall-flies. The species comprising the genera *Toxares* (*Trionyx*), *Ephedrus*, *Monoctonus*, *Praon*, *Aphidius*, *Lysiphlebus*, *Diæretus*, and *Trioxyis*, forming the Braconid group *Aphidiides* of the *Ichneumonidæ*, are all parasites in the bodies of various plant-lice; some of the species, more especially of *Aphidius*, are at times particularly abundant, as instanced by the numerous pierced inflated *Aphis*-skins, which are such obvious evidence of previous parasite occupancy. Coming to the *Chalcididæ*, the enumeration of the *Aphis*-frequenting genera would be wearisome; suffice it to say they are numerous, though as yet but little understood. The economy of insects is truly wonderful; here we have the plant limited by an *Aphis*, this is preyed upon by an *Aphidius*, which in turn serves to nourish an *Asaphes*, a *Chrysolampus*, or not improbably one of the *Ceraphronidæ* (*Oxyura*). These, of course, are the cultivators' enemies, being parasitic in a degree too far

advanced for *Aphis* limitation. Conjecturally the chain might be lengthened still further by supposing the *Myinidæ*, which are frequently bred from *Aphides*, to be parasitic on one of the above-mentioned Chalcids. This treble-linked parasitism is clearly foreshadowed, for, on plate 64, Mr. Buckton figures a cocoon of *Coryna* (= *Chrysolampus*) containing five small pupæ of its parasite (fig. 4). However, parasitism to the second degree is sufficiently involved for present study, and more especially here, where we introduce the collateral parasites of the various external natural protectors, which are also numerous.

The relation of *Aphides* to ants, many species of which keep them captive like herds of cattle; the secretion of honey-dew; the individual appearance and habits, whether lethargic or active, in which the species greatly vary, and other interesting points, have not been touched upon. Enough still has been said, I hope, to stimulate some further enquiries into the manners and customs of these insects which have now found so excellent an historian.

Maldon, Essex, August, 1879.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

UNUSUAL FOOD FOR THE LARVA OF *CHEROCAMPA PORCELLUS*.—While searching for the larvæ of *Cidaria silaceata* on the *Epilobium angustifolium* (willow herb), I was surprised to take a fine full-grown larva of *C. porcellus* off a stem of the same plant, the leaves of which it had nearly devoured, as well as those of other stems.—F. O. STANDISH; 8, St. Paul's Terrace, Cheltenham, September 9, 1879.

[At page 94 of Kaltenbach's 'Pflanzen-feinde' we read: "This larva may be found from July to September on bedstraw (*Galium verum*), willow-herb (*Epilobium hirsutum* and *angustifolium*), loose-strife (*Lythrum Salicaria*), and vine (*Vitis vinifera*)."—E. A. F.]

DICRANURA BICUSPIS LARVÆ.—On Saturday last I had the pleasure of taking a single larva of this insect on alder. It was hardly earned, for, having a pole twelve feet in length to thrash the boughs with, the work was hard. My impression is that the larva feeds very high up the trees. The larva taken on Saturday is nearly full grown. I got a male specimen of the perfect insect

in the first week in July, at rest on the trunk of the same tree.—J. B. HODGKINSON; Preston, September 15, 1879.

LYCÆNA CORYDON AT LEWES.—*L. Corydon* is now common on the Downs here—fully a month later than the average date.—J. H. A. JENNER; Lewes, September 15, 1879.

STERRHA SACRARIA NEAR ASHFORD.—As we were carrying peas from the field on the 1st instant, a small moth rose from a pea-wad which I was in the act of moving, and immediately settled again. Observing that it had a peculiar habit of letting its wings down far below the stem on which it was sitting, so as to form a very steep “roof,” I obtained a pill-box and secured it. Next day I handed over the box to my friend, Mr. W. R. Jeffery, who pronounced the insect to be *S. sacraria*. It proved to be a female, and in the box were found several eggs, so I hope we may hear something of the progeny at a future occasion.—THOMAS H. HART; Kingsnorth, Ashford, Kent, September 19, 1879.

STERRHA SACRARIA.—Whilst walking across the meadows lying in the valley between Buckhurst Hill and Chigwell, during the afternoon of August 17th, I disturbed a specimen of *S. sacraria* from the grass. As I am not aware of any record of the occurrence of the moth in this part of Essex, perhaps it may be worth while to make a note of the fact. It is a male, and considerably damaged; not having any insect-catching gear with me, I carried it home in a cigar-light box, and possibly did not add to its beauty in so doing. A careful investigation the next day in the above-named fields failed to disclose another specimen.—B. G. COLE; Buckhurst Hill, Essex, September, 1879.

ACRONYCTA ALNI.—I enclose you a sketch of a larva of *Acronycta alni*, taken from lime (*Tilia*) this season by Mr. Chappell, of Manchester.—H. A. AULD; Bank of England, Manchester, September 16, 1879.

ACRONYCTA ALNI.—I accompanied Mr. Hind, of this city, with one of his sons to Sandburn last evening. His son had the good fortune to take a fine larva of *Acronycta alni* feeding on mountain ash, close to the tree upon which Mr. Birks took one at sugar many years ago.—W. PREST; 13, Holgate Road, York.

NONAGRIA BREVILINEA AT MONK'S WOOD.—I captured a very

fair specimen of *Nonagria brevilinea* flying over reeds in Monk's Wood, when sugaring there on the night of July 18th. The specimen was identified by T. G. Styan, Esq., B.A., of Trinity College, and also by Mr. Brown, of Cambridge. As far as I have heard, this is the first specimen of *Brevilinea* taken in the above locality.—A. E. HUNTER; Jesus College, Cambridge, August 29, 1879.

LEPIDOPTERA TAKEN IN 1879.—At the end of June I collected 3650 pupæ of *Abraxas grossulariata* from a garden in the neighbourhood of Manchester. The imagines appeared on 1st July, and the number which emerged kept increasing each day. On the 11th, 180 appeared: I then discontinued collecting. About one hundred varieties are now set out, so that I think it may be inferred that species as often as not are much liable to vary, even after having fed in their wild state. Fresh specimens of *Chortobius Davus* were flying on Chat Moss on 12th July. On the 19th, at Lyndhurst, in the New Forest, *Aplecta herbida* was just over, the banded variety of *Boarmia repandata* had been taken freely at sugar, together with *Calligenia miniata*, *Thyatira deraea*, *T. batis*, *Acronycta tridens*, *Leucania turca*, *Noctua brunnea*, *N. festiva*, *Euplexia lucipara*, *Aplecta nebulosa*, and a number of other common things. I remained in the Forest until the 28th. During the first few days *Zygæna meliloti* was fresh, and I captured a confluent variety. *Boarmia roboraria* was just over, one specimen taken being rather worn. For several days I noticed that both *Limenitis Sibylla* and *Arygnnis Paphia* were scarce, but the 28th being a bright and favourable day, they were abundant, fresh from the pupa. There were, however, very few female *A. Paphia* on the wing, yet my companions took a beautiful specimen of the var. *Valezina*. I first made my acquaintance with the Forest about ten years ago, when *Catocala sponsa* was so plentiful that I knocked them off the sugar. Since that memorable year until the present I had not noticed many of the several species which are periodically abundant there. *Lithosia quadra* sometimes turns up in plenty, but this year might almost be chronicled as the "Quadra year." I have had the pleasure of collecting a number of the larvæ of that insect, and brought away with me 2000 of them, but regret to find that they are uncommonly cannibalistic, for each I succeeded in rearing must have eaten at least six of its

fellows before assuming the pupal form. I might easily have taken ten times the number of *L. quadra*, but considered those collected sufficient for myself and friends. On August 2nd, at Lindo Common, near Stockport, *Hyria auroraria*, *Crambus margaritellus*, and *C. Warringtonellus* were flying and in good condition. On the 9th, near Chat Moss, I found *Cucullia chamomillæ* feeding on the flowers of the devil's daisy, and exposed to the mid-day sun. The markings of the larvæ bear a striking resemblance to the calyx of the flower upon which they rest. At Cleethorpes, in Lincolnshire, on August 23rd, *Nonagria Elymi* was worn, *Agrotis præcox* just out, and the larvæ of *Chærocampa porcellus* and *Macroglossa stellatarum* were plentiful upon the bedstraw growing on the sandbanks along the shore. *Agrotis velligera* was to be taken at the flowers of the sea-holly. *Pyrameis cardui* and *Plusia gamma* were in profusion. On the 30th, at Greenfield, in Yorkshire, *Charcæa graminis*, *Heliophobus popularis*, *Larentia cæsiata*, and one *Penthina sauciana* were in good condition. On September 6th, in Sherwood Forest, *Noctua glarea*, *Amphipyra pyramidea*, *Cymatophora diluta*, and *Euperia fulvago* were about the only insects at sugar except *Noctua xanthographa*. *E. fulvago* came freely to sugar, after rain and when the ground was moist, but not more than five or six specimens could be seen when the ground was dry. On September 13th, *Hydræcia nictitans*, *Celena Haworthii*, and slightly-worn specimens of *Carsia imbutata* were flying on Chat Moss and some good larvæ yielded to the beating-stick. During the day I took a number of the following:—*Smerinthus ocellatus*, *S. populi*, *Dicranura vinula*, *Notodonta dictæa*, *N. dictæoides*, *Platypteryx lacertula*, *P. falcata*, *N. camolina*, *Saturnia carpinii*, and *Acronycta leporina*, full fed with the exception of *N. dictæa* and a few *D. vinula*, which were only half-size. So far I have found the present a tolerably good season, but several of the species enumerated were late in appearance. It will doubtless be interesting to have the experience of others on the subject.—HENRY A. AULD; Blackheath.

CAPTURES ON THE LINCOLNSHIRE COAST.—With the exception of a little about Cleethorpes, hardly anything seems to be known of the Lepidoptera of the Lincolnshire coast; consequently, the results of a short expedition to Skegness, in company with Mr. C. W. Richardson, of Wakefield, dating from July 16th to

28th last, may be worth placing on record. The whole of the Lincolnshire coast is of singularly uniform character, and by no means inviting to an entomologist, being either mudflats or sandhills throughout its entire course. Sandhills prevail at Skegness. Inland it is still more dreary, there being hardly anything but bare meadows, with few trees, and the hedges are stunted and dry. Our collecting was confined to the sandhills. Perhaps the most interesting species taken was *Eupithecia innotata*, of which I boxed two specimens off marram grass, &c. The imago is very like *E. fraxinata* in shape and markings, but is bigger, though the larva, judging from a figure which Mr. Crewe has very kindly let me see (drawn from a Continental specimen), is evidently very different. *Nonagria Elymi* was very abundant; this species, formerly so rare in collections, evidently occurs all along the coast from Yorkshire, at Spurn, right away to Norfolk. At first we were rather at a loss to account for the occurrence in plenty of several insects usually considered marsh or fen species; such as *Nudaria senex*, which abounded on the sandhills; and *Herminia cribralis* also was common enough. We afterwards found that however hot and dry the day was, the sandhills, and particularly the hollows, were excessively damp in the evening; indeed we were soaked through every night we went out, even in the finest weather. This, with the presence of several marsh plants, of course was sufficient to account for the insects. At dusk we generally sugared the posts, and I never saw *Noctua* come more freely; but for the quantity, never, I think, did I see so common a lot. The species taken in various ways, omitting those already mentioned, and those of almost universal distribution, were *Charocampa elpenor*, *Lithosia complanula*, *Hemithea thymiaria*, *Acidalia scutulata*, *A. interjectaria* and *A. imitaria*, *Timandra amataria*, *Eupithecia centaureata*, *Melanthia ocellata*, *Pelurga comitata*, *Leucania comma*, *Arylia putris*, *Xylophasia subulstris*, *Mamestra aljecta*, *M. anceps*, and *M. albicollis*, *Miana literosa*, *M. fasciuncula*, and *M. arcuosa*, *Caradrina Morpheus* and *C. blanda*, *Noctua plecta*, *N. C-nigrum*, and *N. rubi*, *Aplecta occulta* (one fine female specimen), *Hadena pisi*, *Scoparia lincolalis*, *Crambus perlellus* and *C. Warringtonellus*, *Anerastia lotella*, *Homocidoma nimbella*, and *Pterophorus pterodactylus*: this last was flying in hundreds, and we had frequently half a dozen in the net at once.—GEORGE T. PORRITT; Highroyd House, Huddersfield, September 10, 1879.

LEUCANIA STRAMINEA NEAR STAINES.—I took a specimen of what I take to be *Leucania straminea* at Laleham Ferry, on the south side of the river, last Saturday. Laleham Ferry is about two miles from Staines. I saw no others about. Is this a new locality for this moth? Newman only mentions one in his 'British Moths.'—G. E. M. SKUES; 21, Burton Crescent, W.C., August 14, 1878.

[There are several localities for *L. straminea* in the London district.—ED.]

MOTHS CAUGHT IN THE BLOOMS OF THE BURDOCK.—I have on several occasions found moths caught by the hooks with which the scales of the involucre of the burdock (*Arctium tormentosum*) are armed. The moths were in all the instances quite dead, firmly hooked, and in some cases pierced on each side of the thorax underneath the wings. Sometimes the wings are more or less damaged in the struggles of the moth to escape; at other times the moth has been quite perfect, and with all the appearance of a living insect sitting on the flower, until, being touched, its condition was seen at once. In one instance the semblance of life was so complete that I was in the act of trying to box it off the flower before I perceived its real state; in this case the moth was *Lithosia stramineola*.—[Rev.] O. P. CAMBRIDGE; Bloxworth Rectory, September 3, 1879.

TORTRIX DUMETANA.—In his notes on the Tortrices of Surrey, Kent, and Sussex (Entom. xii. 218), Mr. W. P. Weston says this species occurs in "oak woods" near Lewes. I have never known of any locality in an oak wood about here. I find the species in some number every year along the hedges on the chalk, where oak is quite absent. I have an idea that the species feeds there on *Clematis vitalba*.—J. H. A. JENNER; Lewes, September 15, 1879.

THE LATE SEASON.—The results of my observations this year as to the time of appearance of various insects accords very much with those obtained by other collectors. For example, the ova of *Tæniocampa opima* hatched in 1878 on May 4th, in 1879 on May 18th; and those of *Liparis dispar* in 1878 on April 23rd, in 1879 on May 21st. This year I took the larvæ of *Orthosia ypsilon* on June 28th; last year I took the larvæ as early as May 7th, and had imagoes out on June 27th. This year I found

larvæ of *Diloba cæruleocephala*, about half-grown, on June 27th; last year I took them full-fed on May 23rd. This year I saw a full-fed larva of *Odonestis potatoaria* near Farnham on July 16th, while last year the imago was out in Staffordshire on Midsummer-day. And once more, *Dicranura vinula* emerged from pupa in 1878 on May 11th, while in 1879 it, too, put in an appearance only on June 24th. The *Tæniocampæ* turned up at the shallows about the same time in both years, the difference (if any) being slightly in favour of the present year, as I find my first captures registered this year on April 1st, while last year I got nothing till the 11th of the same month.—[Rev.] CHARLES F. THORNEWILL; Burton-on-Trent, August 21, 1879.

COLOURED PAPER FOR CABINET DRAWERS.—I noticed last summer, in a collection of butterflies on the Continent, that the families of *Papilio*, *Leucophasia*, *Pieris*, *Anthocharis*, *Gonepteryx*, and *Colias* were in a case lined with black paper instead of white; it had a very striking effect, and served to show the markings extremely well. I daresay this is nothing new, but you may think it deserving of notice.—J. H. LEECH; Park Villa, Wraxall, Isle of Wight.

HAGGERSTON ENTOMOLOGICAL SOCIETY.—September 14th, 1879, was an important day in the annals of this society, being the twenty-first anniversary of its institution. It was therefore arranged to commemorate its majority by holding a dinner at the High Beech Hotel, Epping Forest,—chosen chiefly from its being the house usually frequented by the members while on their collecting excursions in the Loughton neighbourhood. The morning of the 14th was anything but inviting; heavy clouds followed a night of continuous rain; but forty-one members assembled at Loughton Station, and were rewarded for their energy by one of the finest days even an entomologist could desire. Separating on entering the Forest, they met again at the High Beech Hotel, and, under the presidency of Mr. Anderson, the President of the Society, enjoyed the very ample repast provided by the host. No regular collecting was done, but many larvæ were found, some rare ones amongst them, such as six *Stauropus fagi*. It was altogether a very successful day, and a pleasant reunion of many old friends.—J. T. C.

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TRYPETA RETICULATA.

By EDWARD A. FITCH, F.L.S.



TRYPETA RETICULATA.

OF the numerous and very pretty gall-making *Trypetidæ* but few species are known as British. This is probably owing to their being overlooked more than to their actual absence; the galls or pseudo-galls are in most cases only the deformed ovaries or flower-heads of various *Compositæ*; hence the insect-inhabited heads are not readily noticeable. A familiar exception to this usual flower-head inhabitancy is the beautiful *Urophora cardui*, L., whose galls are large many-chambered (1 to 8) swellings of the stems of the universally common creeping thistle (*Carduus arvensis*). Our other gall-making species is still further removed from the general habits of the genus, as *T. guttularis*, Meigen, was bred from galls at the top or collar of the roots of *Achillea millefolium* (Proc. Ent. Soc. Lond., 2nd ser., vol. iii., p. 43).

To this meagre list of gall-making *Trypetidæ* I added, in 1872, *Urophora solstitialis*, L., which deforms the ovary of the common knapweed (*Centaurea nigra*) into a hard, woody, but only tactilely noticeable, gall (Entom. vi., 142). Now, thanks to the perseverance of Mr. F. Enock, the gall-making *T. reticulata*, Schrank. (= *pupillata*, Fallen., Meig., Macq., Zetterst.), is proved to be a British species. The pretty *Trypeta continua*, Meig. (= *Spilographa alternata*, Fallen.), which so often deforms the

hips of various roses (*Rosa spp.*) cannot be classed as a gall-maker.

In Walker's Monograph of the British Tephritites (Ent. Mag. iii., 57—85), thirty-three species are described, and a plate illustrates their wing-markings. In Walker's Diptera (Insecta Britannica) sixty-one species are included. *T. reticulata*, Schrk. (= *pupillata*, Fallen.), occurs in neither of these works. The figure above will at once serve to recognise this beautiful species, which is included in the subgenus *Carphotricha*, as also is *T. guttularis*. The wing has been already figured by Dr. H. Loew in Germar's 'Zeitschrift für die Entomologie' (vol v., pl. ii., fig. 53), where two excellent plates of wing-markings, illustrating seventy species, accompanies his monograph of the eighty European species of the genus *Trypeta*, as restricted by Meigen. Dr. Loew's later and larger work, 'Die Europäischen Bohrfliegen,' which is illustrated with twenty-six photographic plates, I have not seen.

Mr. Enock gave me a pair of the imagos of *T. reticulata* last May, and shortly after sent me some of the galled flower-heads of *Hieracium*, similar to those from which they were bred. From these I succeeded in rearing one male and three females of the *Trypeta*, and several specimens of a parasitic *Pteromalus* (probably Förster's *P. Trypeta*).

The plant from which Mr. Enock's galls were collected has been determined, on good authority, to be either *Hieracium umbellatum* or *H. sabaudum*; from the absence of stem leaves it is almost impossible to say which. The gall-maker, however, doubtless affects several of these closely allied and puzzling *Compositæ*. It is also very probably generally distributed, though hitherto overlooked. In Prof. J. W. H. Trail's "Galls and their Makers in Dee" (Trans. Nat. Hist. Soc. Aberdeen, 1878, p. 66), we read:—" *Hieracium boreale*, Fries. B. The gall, like that in *Hypochaeris radicata*, is a swollen ovary, oval, one-sixth by one-twelfth to one-eighth of an inch, blunt at the ends, surface with four blunt longitudinal ridges, between which are less distinct ridges, hairy; walls hard and woody, enclosing a cell inhabited by a larva of *Trypeta*. Two occurred in a flower-head gathered at Banchoory in August; the affected flower-head was not altered externally." This description clearly refers to the galls of *T. reticulata*.

The addition of other species to the British list is fore-shadowed. Dr. Trail has described the galled flower-heads of *Hypochæris radicata* (Scot. Nat. iv., 16, and Trans. Nat. Hist., Aberdeen, 1878, p. 65), which were found at the end of July on the Old Aberdeen Links, but were very scarce. Mr. F. Walker gave the name of *Tephritis signata*, Meig., to the species reared by Mr. Moncreaff, of Southsea, "on September 14th, from galls in the receptacle of *Inula crithmoides*; the receptacle becomes thickened and enlarged, and has a hard woody texture. About seven cells in one flower-head. The larva forms a cocoon." (Entom. v., 450). This determination must be wrong, for the larva of Meigen's *T. signata* is the well-known cherry and honeysuckle-berry feeder. According to Loew *T. signata*, Meigen and Walker, is the *Musca cerasi* of Linné. Mr. Müller exhibited some insect galls on tansy (*Tanacetum vulgare*) to the Entomological Society of London, the larva in which showed the gall-maker "to belong to the Diptera, though not a *Cecidomyia*." (Proc. Ent. Soc., Lond., 1870, p. v.) I have two tansy galls now growing in my garden here, probably similar to Mr. Müller's, so hope to know more of the maker in time; it is well to mention this gall here, though I do not fancy the maker will turn out to be a *Trypeta*. The gall on *Crepis paludosa*, exhibited at the Aquarium Exhibition by Mr. T. R. Billups, is not dipterous; it is most likely a variety of *Aulax Hieracii*. Curtis bred several *Trypetidæ*, but the only true gall-maker he seems to have recorded is the *T. guttularis* bred by Mr. Graham.

Maldon, Essex, September, 1879.

LOCALITIES FOR BEGINNERS.

No. V.—WICKHAM.

By JOHN T. CARRINGTON.

THE best way to reach West Wickham woods from London is by train from any of the South-Eastern termini to Woodside Station. There are frequent trains on week-days and several on Sundays, the return fare being one shilling and threepence.

On leaving the station we turn to the right past the Croydon racecourse, and follow on to a guide-post. Should our first visit for the season be in spring, we might, as we come along the road

thus far, have a beat at the nettles (*Urtica dioica*), and so obtain a batch of larvæ of *Plusia chrysitis* and *P. iota*, both occurring commonly there in some seasons. Continuing on we come to a nice dry bank on the left, upon which grows hawkweed (*Hieracium*), mouse-ear (*Cerastium*), groundsell and ragwort (*Senecio*), and many other low plants. On these we are pretty well sure to find the larvæ of *Chelonia villica*, and perhaps several other species. This bank would well repay a few hours spent in examining it for larvæ by lamp-light on a mild spring night. Having passed this locality we continue on to Shirley Church, when we turn to the left. On our right hand will be seen a fine old oak close fence, which surrounds the park belonging to the Archbishop of Canterbury. This has been long known as the Bishop's Palings, and on them many a rarity has been taken at rest in the daytime. It was here that lepidopterists used to come long ago to find the then prized *Notodonta carmelita*, which may still be found there. In the spring *Cymatophora flavicornis*, *Xylocampa lithoriza*, and *Larentia multistrigaria* may be found on these palings, with possibly *Notodonta trepida*, or even greater rarities, and, during the summer, many Tortrices and Tineina.

Overhanging this fence are some pines (*Pinus sylvestris*). These should be beaten for the larvæ of *Ellopiæ fasciaria*, *Thera firmata*, and *T. variata*; all occurring after hibernation, and readily reared when taken in spring. At the same time imagines of *C. flavicornis*, *Trachea piniperda*, and *Selenia illustraria* frequently fall into the umbrella or net when beating for those larvæ.

On the left-hand side of this road is an open fence and several black gates,—to the entomologist very black, for they form a barrier between him and the fine collecting ground on the other side. Only a few years ago it used to be open to the collector; but now it is closed, with unpleasant notices, and not over civil people to see that these notices are enforced. One cannot help moralising upon this state of things. It seems to suggest one of two things; either a want of liberality on the part of otherwise liberal-minded landowners, who little know how much real pleasure they could give to the students of botany and entomology by granting them permission to roam, as of old, over their preserves; or it suggests that the plant-gatherers or flycatchers have been at some serious mischief, which has caused

this hindrance to their wanderings. I can scarcely believe this is so, or at least hope they have not, for it would indeed be to the entomologist killing the goose with the golden eggs if wanton damage were done where permission is given to collect and admire Nature's beauties. I never had the misfortune to collect with anyone who did such mischief, and I do not think I can remember amongst my entomological acquaintances one who would permit it to be done. Ought we not in return for such permission to protect the property of those who grant the privileges?

Failing an entrance we can work at the wych elms (*Ulmus montana*). From the boughs of these, in May, we may expect to beat larvæ of *Thecla W-album*, and, later in the season, *Abraxas ulmata*. Some ten or twelve years ago *Vanessa C-album* used to occur about here, but it does not appear to have been seen later than that.

Further along this road,—say a mile and a quarter from Shirley Church,—we come to the keeper's house, where there are two paths; that to the left is a private one leading to the Heathy Field. Providing we keep to the path I believe we may collect here, which has probably always been one of the best localities in the neighbourhood. In their season we get from the birch (*Betula alba*) the larvæ of *Notodonta dictæoides*, *N. carmelita*, *N. dromedarius*, *Platypteryx falcula*, *P. lacertula*, *Acronycta leporina*, *Cymatophora fluctuosa*, *C. duplaris*, *Cidaria psittacata*, *Selenia illustraria*, and *S. illunaria*. From oak, in a like manner, *Limacodes testudo*, *Notodonta chaonia*, *N. dodonæa*, *N. trepida*, *Cymatophora ridens*, and *Boarmia consortaria*, with many other species from both trees.

The Heathy Field has always been a favourite corner for both Macro- and Micro-lepidopterists. In 1854 Mr. Stainton, in his charming little book, 'The Entomologists' Companion,' recommends his readers to this corner, where he used to take several rare Micros. It is covered with ling (*Calluna vulgaris*) with one or two *Ericas* intermixed. On the ling may be got, in autumn, larvæ of *Eupithecia nanata*, &c., and, in spring, those of *Agrotis agathina*, *A. porphyrea*, *Noctua neglecta*, *Scodionia belgiaria*, and others. These are best sought for, or swept, at night. *Agrotis agathina* is usually a most difficult species to rear, and, so far as I know, I cannot suggest any good plan. Heather bloom is one of the nicest baits for Noctuæ, and I am

sure one of the nicest to work. At it I have taken many really good species. Sometimes, if we can select a sheltered patch in full bloom, especially if under the shade of some fir trees, we may almost surely make a good bag just after dusk. It is then and there we may expect to find fine large females of *Agrotis agathina*, such as one of my correspondents used to write for to many of my friends, as well as to me, year after year. With these may also be taken *Noctua neglecta* in all the rosiness of fresh birth; while hid away amongst the flowers are one or two suspicious-looking members of the genus *Agrotis*, perhaps *A. nigricans*, *A. tritici*, *A. aquilina*, or an odd *A. obelisca*. These will provide an interesting study for the beginner to separate into species.

Retracing our steps from this strictly-forbidden ground towards the keeper's house we must remember how a lucky collector, while walking here, once beat a larva of *Acronycta alni* and one of *Stauropus fagi* into his net with one stroke of his beating-stick, and, more remarkable still, he bred both on one day the next season. They are now preserved in the club collection of the Haggerston Entomological Society.

Having passed the keeper's we enter a broad path leading to West Wickham village. On each side are pine woods,—again *Pinus sylvestris*. In early spring many pleasant hours have been spent here, when no insects could be seen, in watching the gambols of the squirrels amongst the boughs of these firs. Passing on we come to a low copse of mixed trees, such as birch, hazel, oak, wild cherry, willow, and black poplar. It was here on a certain 29th of May, some years ago, Messrs. A. Harper and J. Smith captured at sugar during a heavy storm an example of the rare *Ophiodes lunaris*. Another rarity has occurred here, and has turned up more than once in the same place, viz. *Madopa salicalis*.

In this copse a very pleasant evening may be spent on a fine night in April, or even March, at the willow bloom. We may get *Hoplorina croceago*, *Trachea piniperda*, and most of the *Tenio-campidæ*, with *Scopelosoma satellitia*, *Cerastis vaccinii*, *C. spadicea*, and an odd *Xylina rhizolutha*. On the same evening by searching the twigs of the birches and other low trees, by the aid of lamp-light, we find the larvae of *Aplecta tinctoria*, *Triphena fimbria*, *T. interjecta*, *T. janthina*, *Noctua baja*, *N. brunnea*, *N. triangulum*, *N. festiva*, and many others. When we arrive in the afternoon,

before commencing, if the sun be still visible, we may take *Brephos parthenias*.

We now make our way past the "Cricketers" inn, at Addington, where the entomologist is soon recognised and made welcome. On the way we should look with the lantern along the palings for larvæ of *Cleora lichenaria*, which is usually abundant on the archbishop's fence, from the corner of the wood at the bottom of the hill to the "Cricketers."

Several good Tortrices have been taken at West Wickham by beating the undergrowth of shrubs when opportunity offers. Amongst these I may mention *Phoxopteryx upupana* and *Eriopsela quadrana*, whilst we may expect to get *Phloxodes demarniana*, *Grapholita Paykulliana*, *G. obtusana*, *Phoxopteryx diminutana*, *Penthina capræana*, and hosts of others.

The soil of West Wickham is gravel, sand, and gravelly loam, with a subsoil of chalk. The flora of the district is extensive and varied.

I have again to thank Mr. E. G. Meek for many kind hints for this article.

Royal Aquarium, Westminster, S.W., October, 1879.

ERRATUM.—In the Loughton article in the last number, pp. 233, 234, read "Smart's Lane" instead of "Snakes Lane."—J. T. C.

EUPÆCILIA GILVICOMANA, Zell.: A TORTRIX NEW TO BRITAIN.

By E. G. MEEK.

I RECENTLY received from Mr. F. O. Standish, of Cheltenham, a series of an *Eupæcilia* under the name of *Argyrolepia Schreibersiana*. The moment I opened the box I found his mistake, and also that it was a species new to the list of Lepidoptera of Great Britain. Under the name of *A. Schreibersiana* Mr. Standish had also recorded its capture at page 205 (*ante*) of this volume of the 'Entomologist.' I packed up some examples and sent them to Dr. Staudinger for identification, not having anything in my European collection of Tortrices with which to reconcile the species.

A day or two following, Dr. Staudinger, being in London,

called upon me. He then saw the series, and agreed with me it was not *A. Schreibersiana*. On his return to Dresden he compared the specimens sent, with others in his collection, and pronounces them to be the *Eupœcilia Gilvicomana* of Professor Zeller, and the *E. flaviscapulana* of Dr. Herrich-Schäffer, the former having priority of nomenclature.

This new and handsome addition to the British list of Lepidoptera is most nearly allied to our *E. curvistrigana*. In our cabinets it should be placed between that species and *E. angustana*.

56, Brompton Road, S.W., Oct. 9, 1879.

[This species occurs near Frankfurt-on-the-Main, but is rather scarce; it flies about the middle of August. The larva lives there, according to A. Schmid, on the flowers of the golden-rod (*Solidago Virgaurea*), around which plant the moths are also captured in Silesia. According to Von Heinemann the larva feeds on *Chenopodium*; and Mühlig bred this species from larvæ which he found in July feeding on the blooms of the wall-lettuce (*Prenanthes muralis*).—KALTENBACH'S 'PFLANZENFEINDE.']

LIFE-HISTORIES OF SAWFLIES.

Translated from the Dutch of DR. S. C. SNEILEN VAN VOLLENHOVEN,

By J. W. MAY.

(Continued from p. 175.)

PHYLLOTOMA TENELLA, Zadd.

See Zaddach, *Beschreib. neuer oder wenig bekannter Blattwespen* (1859), p. 28, Pl. fig. 17.

Phyllotoma aeneo-nigra, flavo-maculata, abdominis lateribus albo-maculatis, pedibus albis, basi nigris. Long. 4 ad 5 mm.

It is owing to the kindness of Mr. P. Cameron, jun., of Glasgow, that I am enabled to give the life-history of this species. I take this opportunity of thanking him sincerely for his good offices. I first received from Mr. Cameron some imagos, and subsequently several leaves with some larvæ and a pupa. That the present species is indigenous (in the Netherlands) was shown in the first instance by the larva having been found in this country,—it was observed by Mr. Snellen on

the birch,—and in the second place by a discovery of Mr. C. Ritsema, who found the perfect insect, in the month of May, at Ginneken, sitting on a small birch tree. Mr. Ritsema captured the insect, which was a female.

The Scotch entomologist above named communicated to me the following particulars respecting the life-history of this insect:—

The egg is always laid at the tip or on the edge of a birch leaf, never in the middle of the leaf, and, as a rule, only one egg is laid on a leaf; sometimes two eggs may be found, and even, once in a way, three. On emerging from the egg the larva begins forming a broad mine in the leaf, and the upper surface above the mine immediately becomes black or dark brown. The space between the surfaces of the leaf is regularly enlarged, so that, by the time the larva has attained its full size, about three-fourths of the whole upper surface has been undermined. The little animal is very careful always to keep its habitation clean, and for this purpose makes an opening at the edge of the leaf, through which its excreta are ejected. In the mine the larva lies on its back, feeds in this position, and rests after feeding at the spot where it has last mined. When full grown the larva spins within the leaf a thin brown cocoon of a circular shape and semitransparent; this cocoon is so roomy that the larva can easily move itself in all directions.

There are two broods in the year; the first occurs in June, July, and August; the second from the end of August through September and the rest of the year into the following spring, when the larva changes to a pupa. The spring pupa then remains a fortnight or three weeks in the cocoon before the imago makes its appearance.

The young larva (August) is dull brownish yellow, and has a broad green longitudinal line on the back after the fourth segment. At this stage the head is brown at the sides, yellow in the middle, and has projecting brown jaws. On the middle of the first segment of the body are two brown triangular spots, and on each of the following two segments are two fine transverse lines. At the sides the segments project strongly in the middle. (See fig. 2).

The full-grown larva is deep or pale yellow (the individuals differ in colour); the first three segments, which form the

thorax, are always much broader than the others. Cameron writes to me that this is more especially the case in young examples; but this is contrary to my observation, which was, however, confined to a single young specimen. In the paler-coloured larvæ traces of a green dorsal vessel can be perceived through the skin. I conclude that the deep yellow larvæ are somewhat older than the paler individuals. The sutures of the head are marked out with brown; the jaws and the antennæ are also generally pale brown (figs. 3 and 4). The thoracic legs are blunt, conical processes, and consist of two joints, the latter of which is very small and nipple-shaped, and without any trace of a claw (fig. 5); the middle legs are thick and very blunt (fig. 6), and the last pair is reduced to an oval blunt, wart-like prominence, having two brown oblong spots underneath (fig. 7). I was not able to count the middle legs.

Before changing to a pupa the larva lies in the cocoon in a curved position, like the larvæ of the weevils, as represented at fig. 8 (the head is shown at fig. 9). It may here be remarked that figs. 8 and 9 were drawn at the end of March, and fig. 4 in the autumn; this may in some measure account for the difference in colour. I am unable to say positively when fig. 3 was drawn, but I think in September.

The pupa (fig. 10) shows very clearly the different divisions of the body, and gradually assumes the colouring of the perfect insect.

Fig. 11 represents the imago, a female; it is small and rather broad. The head is unusually broad, and connected to the prothorax by a narrow neck; the eyes are very projecting. The general tint of the body is a somewhat metallic-black. The head has two broad lines along the inner margin of the eyes, a spot between the antennæ in the form of a horseshoe, the clypeus, the upper lip, the mandibles, the cheeks, and the palpi, white or yellowish white. The antennæ, consisting of ten joints (see fig. 12), are brown, and are somewhat thickened towards the apex; the first two joints are black bordered with white. The posterior margin of the prothorax and the tegulae are yellowish white; the cenchri are greyish brown. The opening in the dorsum between the first and second segments of the abdomen is rather large, and on the bordered margin of each segment is a bluish white oval spot (fig. 13). The sheaths of the ovipositor are shining

black, with reddish brown curved hairs at the apex; the ovipositor itself is pale brown (fig. 14). The legs are white, with a slight tinge of brown; the base of the coxæ and the larger part of the femora are shining black: there is also a fine black line on the inner side of the coxæ; the apical joint of the tarsi is brown. The wings are yellowish at the base and colourless at the apex; the stigma is black, from which a curved band of a brown colour extends across the wing. The costal margin as far as the stigma is yellow; the principal nervures are black; the transverse and some of the longitudinal nervures are milk-white (fig. 15).

With us this species is scarce, but in some parts of Scotland it appears to be rather common; it also occurs in North Germany, among other places at Insterburg and Königsberg. The male is still undiscovered.

CALANDRA ORYZÆ AND ITS ASSOCIATES.

By T. R. BILLUPS.

HAVING a vacancy left in my cabinet for *Calandra oryzæ* and its allied species *granaria*, I asked my friend Mr. Fitch, to whom I am greatly indebted, if he could give me any assistance with those species to fill up the space thus left. That gentleman, with his usual kindness, at once consented to help me with the required desiderata, and on the 3rd of September last I received from him a box containing not quite three and a half ounces of dust, broken bits of corn, or, more properly speaking, the remains of what had been bored out, rubbish, &c., presumably collected up from one of that gentleman's granaries or storehouses. I had not the slightest idea of receiving more than one, or probably two dozen at the most, of the insects I required; but one may judge of my surprise when, on opening the box, I found it literally teeming with insect life; not only with *Calandra*, but with several other species of Coleoptera. To capture the whole of these was no mean task—in fact, one I did not easily accomplish; however, after much patience, I succeeded in getting most of them into the laurel-bottle. Thinking the results might not be uninteresting to many of your readers induced me perhaps to be somewhat more careful than I should otherwise have been.

Mr. Fitch, in his very interesting and studious article on "Granary Weevils" in the February number of this year's 'Entomologist,' speaks of having met with no less than fifteen different species of Coleoptera in company of *Calandra*; and as his experience is the result of three years' hard study, I am somewhat surprised he has not met with more, considering that out of so small a quantity as three and a half ounces of borings, &c., I should meet with no less than eleven, besides the two *Calandra*, and two of those are not mentioned by that accurate observer in his list before mentioned. The numbers and species captured by myself were as follows:—*Calandra oryzae*, or the rice weevil (650), *C. granaria*, the true corn weevil (17). Then come their companions, but whether in mischief or not is somewhat doubtful,—*Hypophloeus depressus* (791). Cox, in his 'Handbook of the Coleoptera of Great Britain,' speaks of this insect as being not common; at any rate, if numbers are any criterion in the case, they were the most plentiful. Then comes the curious little *Silvanus surinamensis*, with its row of teeth on each side of the thorax (45), the pretty and very active *Alphitophagus quadripustulatus* (21); of the dark brown *Rhizopertha pusilla*, which Mr. Fitch says he found so abundant, there were only fourteen; and of the flat red-yellow *Læmophloeus ferrugineus* (5); of *Typhæa fumata*, one of the insects not yet found by Mr. Fitch, and mostly to be met with at stack-bottoms, there were five; of the flat black or red-brown *Trogosita mauritanica* four. In addition there were two of *Tenebrio molitor*, the larvæ of which are the well-known mealworms; and last, but not least, there was one *T. obscurus*. This Mr. Fitch does not mention among his observed insects, but he tells me he has some five or six of these creatures, walking about one of his old stores, collected in 1876 and 1877. The total number of living insects taken by myself was 1554, irrespective of those which were too active for me and got away, and the dead, perfect and broken imagos were nearly in the same ratio, to say nothing of the larvæ, which I did not attempt to count. I think, after looking at the numbers taken from so small an amount of rubbish, one can scarcely be surprised when reading Mr. Fitch's startling account of the vast quantities of corn and other grain destroyed by the two *Calandras*, leaving out of the question what part of economy their associates may play, and which seems at present, as I said before, somewhat

doubtful. The fecundity of the *Calandra* can scarcely be imagined, as it is reputed to be one of the most prolific of coleopterous insects. If report speaks truly, that a single pair may produce six thousand in one year, we may well enquire what remedy we have to check the ravages and enormous damage of these insect pests.

While writing this the post has brought me a note from Mr. Fitch, in which he says:—"I have sent you a few more granary Coleoptera in hopes that *Hypophlæus* at any rate will not now be a desiderata to either yourself or friends." The contents of this box will form the subject of a second note.

4, Swiss Villas, Coplestone Road, Peckham, October 4, 1879.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

EFFECT OF THE WET SUNLESS SEASON ON THE LEPIDOPTERA OF THE NEW FOREST.—I visited Lyndhurst on 10th July, and returned to town on Tuesday, 12th August; during the whole period I do not think a day passed without rain. As might be expected, there was a retardation of the time of appearance of all Lepidoptera, but especially the Rhopalocera. *Argynnis Paphia* and *Argynnis Aglaia* were not seen on the wing till 18th July; the males of *Paphia* were not abundant until the end of the month, and the females not before the early part of August. *Argynnis Selene*, which usually appears early in June, was on the wing the whole of July, and I captured a female on 11th August apparently but just emerged from the chrysalis. *Argynnis Adippe*, which is sometimes met with late in June, appeared first on 19th July and continued on the wing till the period I left, viz., 11th August. *Limenitis Sibylla* was first seen 21st July, but it was not till August had arrived that the species appeared in any abundance. But the most noteworthy fact was, that the weather was so cold that the swift-flying butterflies *A. Paphia* and *L. Sibylla* were benumbed, and could, even in the middle of the day, be easily taken off the brambles with the fingers; and on one occasion when I placed my net over *A. Paphia*, var. *Valezina*, the specimen fluttered down amongst the herbage and allowed me to take it in my cyanide bottle. It was startling to observe *Limenitis Sibylla* flapping along as slowly as a *Pieris*, and I often thought of

Mr. Stainton's remark on this species in his 'Manual of British Butterflies,' page 22, that it was "oftener seen than caught." The butterflies above-mentioned were very abundant, and I counted thirty specimens of *Argynnis Paphia* within reach of my net at one time. The above instances are sufficient to illustrate the peculiar effects of the season on the time of appearance of Lepidoptera, and I will add only in conclusion that I have now, still feeding, larvæ of *Enistis quadra*, the perfect insect generally appearing in July, but this year no imagines were taken till after the first week in August.—J. JENNER WEIR; 6, Haddo Villas, Blackheath, September 7, 1879.

COLIAS EDUSA ABUNDANT AT FOLKESTONE. — This insect is now abundant between Folkestone and Sandgate. Nearly all the males are remarkably small, while the females are of the usual size. I saw one of the variety *Helice*, but did not take it.—H. RAMSAY COX; Folkestone, September 19, 1879.

ABUNDANCE OF *COLIAS EDUSA* AT DOVER. — During a visit to Dover, extending from the 14th to the 22nd of September, I observed *Colias Edusa* in large numbers. Three collectors, who were working for varieties, took amongst them upwards of 300 specimens. The females seemed to be the most numerous. I captured two fine specimens of the variety *Helice*, and saw seven others captured in one day. They seemed very local, and I only saw them on the Castle Hill.—THOS. EEDLE, Jun.; 37, Dunloe Street, Hackney Road, E., October, 1879.

CAPTURES AT OBAN.—At Oban, in the West Highlands of Scotland, this year I have taken *Erebia Blandina* in abundance. *Argynnis Aglaia* also was very plentiful, while *Pyrameis cardui* and *Plusia gamma* literally swarmed.—C. D. SNELL; 56, Jeffrey's Road, Clapham Rise, S.W., September 13, 1879.

EXTRAORDINARY ABUNDANCE OF *PYRAMEIS CARDUI* AND *PLUSIA GAMMA* IN SAXON SWITZERLAND.—I have noticed the numerous notes in September's 'Entomologist' on these two insects, and have found that there is the same abundance here as there appears to be in England. *P. cardui* literally swarms about the cherry and other fruit trees which are planted by the roadside. As far as I can judge, no other species is intermixed with them; when I pass by the clover-fields they rise in clouds. It is next to impossible to net any small butterfly of any consequence in the

daytime, owing to the enormous number of *P. gamma* which rise from the grass as I walk through it, and at night the rooms are filled with them if the windows are left open; they almost put out the lights by knocking up against them. I have never noticed anything like this profusion before. Last year I saw very few *P. cardui* here, and the number of *P. gamma*, in comparison with this summer, was very limited.—C. W. THWAITES; Villa Rosa, Wehlen, Saxon Switzerland, September 8, 1879.

DIURNI OBSERVED IN THE STREETS OF MANCHESTER.—If additional proof were needed of the unusual abundance of *Pyrameis cardui* this summer, it would surely be found in the fact of a fine specimen having been observed by me yesterday morning flying in almost the centre of Manchester. I have also observed *Pieris rapæ*, *Vanessa urticæ*, and *Polyommatus phleas* at different times in the streets here; and *V. Io* and *V. Atalanta* occur in most years in the streets and suburbs, though I have not observed them this abnormally wet summer.—J. C. MELVILL; Prestwich, September 5, 1879.

ACHERONTIA ATROPOS AT SHREWSBURY.—A very good specimen of this moth was taken at Ascham this week, and is now in the possession of the Rev. Loftus Owen. It is a great rarity here at the present time, but in the year 1870 the larvæ were exceedingly common on the potato and tomato.—B. PRITCHARD; Frankwell Nursery, Shrewsbury, Sept. 18, 1879.

ACHERONTIA ATROPOS AT SEA.—I have just received a fine living specimen of *A. Atropos*, caught on board the 'Cork' light-ship, which is moored seven miles from the land.—F. KERRY; 22, Maria Street, Harwich.

BOMBYX CASTRENSIS NEAR HARWICH.—In August last I caught some larvæ of *Bombyx castrensis* on the bentlings near here. I might have taken many more, but not knowing what they were I did not take more than fifty. These began to spin up the same day, and the imagos appeared in September. The eggs from which these larvæ were hatched must have been under the water twice in every twenty-four hours during the winter months.—F. KERRY; 22, Maria Street, Harwich.

ACRONYCTA ALNI.—Mr. J. Cooke, of 4, Newdegate Street, Radford, found, on September 21st, a larva of *A. alni*, feeding upon oak in Wollaton Park.—JOSEPH BROOKS, Sec.; Nottingham Working Men's Naturalist Society.

ACRONYCTA ALNI.—A larva of this rare moth was found at Sherringham, near Cromer, August 22nd last year, feeding on Spanish chestnut. Acting on advice we placed a hollow bramble stem with it, and it was soon taken possession of by the larva for pupation. A fine imago emerged May 22nd. — H. MILLER; Ipswich, October, 1879.

LEPIDOPTERA AT GUILDFORD.—It may interest some of your readers to know that, at Guildford, *Abraxas grossulariata* has become abundant and variable, the alar markings being seldom constant, and very often the two superior wings having different patterns. Insects seem on the whole to have been retarded in development by the wet season, especially those bred in confinement. The summer roses were all destroyed by the Tortrices, the cankerworms of our poets, but not of our Biblical Translators, who employ the word, I hold, for immature locusts. —A. H. SWINTON; Birfield House, Guildford.

LITHOSIA MESOMELLA IN THE NEW FOREST.—May I be permitted to answer Mr. Goss's note (Entom. xii. 205)? I rather fancy he must have misunderstood the drift of my remarks (Entom. xii. 106), and though the matter is not of much importance, I hope he will excuse me for correcting the error into which he seems to me to have fallen. My chief object in penning the note on the *Lithosiidæ* was to point to their rarity as a class, and that of the other lichen-feeding species to be captured in the Lyndhurst district, as compared with some other species whose food-plants are not nearly so abundant in the Forest,—for instance, *Limenitis Sibylla*. Mr. Goss will, I dare say, recollect that besides the immense amount of lichen which has spread over the trees and bushes in the Forest to such an extent that it alone may be said to preponderate over the amount of food supplied by the leaves of any one species of tree grown there, the soil of all the heaths is densely overgrown by the ground-lichens, which, I believe, form the food-plants of *Lithosia mesomella*. Looking at these facts, it seemed to me rather odd that while the *Argynnidæ* and *L. Sibylla*—all of which are exposed, as larvæ, like the *Lithosiidæ*, to the risk of hybernation—are usually common and frequently swarm, one might, during the two seasons I had an opportunity of looking after them, have worked for *Lithosiidæ* evening after evening and hardly seen a

score altogether.—B. LOCKYER; 27, King Street, Covent Garden, W.C., August 5, 1879.

CENECTRA PILLERIANA, FEMALE.—Last June, in the Isle of Wight, I gathered various low plants, the shoots, leaves, and flowers of which were being fed upon by larvæ, but unfortunately, being as little acquainted with some of the plants as with the larvæ thereon, I placed the whole collection in a large flower-pot. The results, as might be expected from such a desultory mode of breeding, were not of a very brilliant character. However, I had the pleasure of obtaining several female specimens of *Cenectra Pilleriana* by this arrangement. This sex has not, I believe, been hitherto recorded. I may add that all my captured specimens of this species, about seventy in number, were males.—RICHARD SOUTH; 13, Bonchurch Villas, Ealing, October 20, 1879.

A NEW LOCALITY FOR *EXÆRETIA ALLISELLA*.—In the months of January and February last I devoted much time to collecting the various root-feeding larvæ in the lanes about Banstead Downs, and during July was much surprised to breed, along with numbers of *Ephippiphora fœneana* and *Dicrorampha simpliciana*, twenty-three fine specimens of *E. Allisella*. As far as my observations go, I should be inclined to agree with Dr. Schleich (Nat. Hist. Tineina, vol. xiii., p. 394), that the larva bores down the stem into the root, and so hybernates, or feeds slowly through the winter. All the roots I brought home were cut down close previously to my digging them up, and the earth well shaken out, so that the larva must have been in the bottom of the stem close to the root or in the root itself. I can hardly reconcile the above habit with that of causing the shoots to droop in May (Id., p. 322). The shoots that are up at that time are all new ones, and the larva nearly, if not quite, full fed. As the imagos are out in July, it is more likely the shoots would appear to be drooping in August through the operations of the larva inside. I do not think it possible that the larva, being so near maturity as it would be in May, would quit the root or stem to bore into a fresh stem.—G. ELISHA; Shepherdess Walk, City Road, N.

PRIONUS CORIARIUS AT KEW.—Whilst taking a stroll one day at the end of last August in the pleasure-grounds of Kew Gardens, I observed on the trunk of one of the trees a beetle, which proved to be a fine specimen of *Prionus coriarius*.—HAROLD HODGE; 33, Almorah Road, Islington, N., September, 1879.

CANTHARIS VESICATORIA, *Linn.*—The blister-beetle is of sufficiently rare occurrence in England as to make the capture of it worthy of notice. A single specimen was taken on the 8th of September by my friend, Mr. H. T. Mennell, at Freshwater, Isle of Wight, sunning itself on a leaf of the common nettle. This insect, when caught, and for several days after it was killed, emitted a very powerful and offensive odour, and the box it was pinned in was perfumed by it with a scent very strongly resembling a dead mouse in a state of decomposition.—V. R. PERKINS.

DELEASTER DICHROUS.—While sitting at supper with friends at Hythe, on the 6th June, an insect flew into the flame of the gas and fell on to the table. Perceiving it was a beetle I secured it, and subsequent examination proved the value of the capture. A few evenings later I caught a second specimen on the wing. This is the first time I have met with this species, and know nothing of its habits. It is certainly a very conspicuous insect on the wing.—THOMAS H. HART; Kingsnorth, Kent.

AN ALLEGED INSTINCT OF MOSQUITOES.—It is commonly stated that when a mosquito is engaged in sucking the blood of its victim it holds up its posterior pair of legs and by their means perceives the agitation of the air caused by an approaching hand in time to avoid the blow. On examining gnats, whether resting upon a window-pane, a rail, or any other body where blood-sucking is out of the question, it will be found that in a majority of cases they adopt this same attitude, either with both the hind legs, or at any rate with one of them. Nor do they seem aware of an approaching hand sooner than many other insects.—J. W. SLATER; Aylesbury, September, 1879.

SUGGESTED REMEDY FOR INJURIOUS INSECTS.—In a recent number (June, 1879) of the 'Canadian Entomologist' there is a four-page article by Dr. H. Hagen, in which the suggestion is thrown out that the use of beer mash or diluted yeast would prove beneficial in destroying certain destructive insect pests, where syringing or direct sprinkling of the pests is practicable. This recommendation has not been put to actual test, but the author brings it forward on the ground that "it is neither an hypothesis nor a guess-work, but simply the application of true and well-observed facts." The remedy is founded on the data said to have been proved by Dr. Bail, of Prussia, by actual experiments

extending over a dozen years, that the fungus of the house-fly, common mould, the yeast fungus, and a fourth small water fungus are all forms or developments of one and the same species. The presence of fatal epizootics amongst certain insects is well known to all entomologists, but whether their communication and action can be readily controlled we must leave to positive proof. So simple a remedy is well worthy of a trial on any attack of *Aphides*, gooseberry grub (*Nematus ribesii*), which has been so destructive this year, gregarious lepidopterous larvæ, or other easily come-at-able pests.—EDWARD A. FITCH.

PRIZE ESSAYS.—Not only will our scientific, but also our sporting, readers hear with satisfaction that Lord Walsingham in conjunction with other gentlemen has offered prizes for the most complete life-histories of *Sclerostoma syngamus* and *Strongylus pergracilis*. The following are the particulars:—"£50 for the best and most complete life-history of *Sclerostoma syngamus*, Dies., supposed to produce the so-called "gapes" in poultry, game, and other birds; £50 for the best and most complete life-history of *Strongylus pergracilis*, Cob., supposed to cause the grouse disease. No life-history will be considered satisfactory unless the different stages of development are observed and recorded. The competition is open to naturalists of all nationalities. The same observer may compete for both prizes. Essays in English, French, or German, to be sent in on or before October 15th, 1882, addressed to the Secretary of the Entomological Society, 11, Chandos Street, Cavendish Square, W."—ED.

REVIEW.

Scientific Lectures. By Sir JOHN LUBBOCK, Bart., M.P., &c.
188 pp., demy 8vo. London: Macmillan & Co. 1879.

IN his preface Sir John Lubbock apologises that this book "does not contain anything new to those who have specially studied the parts of science with which it deals;" but he very properly adds that he hopes "it may be found to present the fact in a condensed, yet interesting form." Of this there is no doubt, for from first to last it has rarely been our fortune to meet with a more interesting and readable book. It consists of six

lectures, the first on Flowers and Insects, the second on Plants and Insects, two on the Habits of Ants, and two on Archæological subjects. The first four more directly appeal to the readers of the 'Entomologist,' but the other two cannot fail to interest the general reader, even be he not an archæologist. There are fifty-four carefully-drawn illustrations, and a coloured plate of the various stages of the larva of *Chærocampa porcellus*. Of these illustrations fifty-one are spread over the first four lectures. We cannot speak too highly of these illustrations. Being chosen by the author with such good judgment, they represent in every instance so exactly what he wishes to convey that even the youngest student cannot fail to understand their purport.

In the first lecture Sir John Lubbock shows the relation of flowers and insects, and the absolute necessity of the one to the other. After shortly referring to the work of former students on this subject, especially Mr. Darwin, he touches upon the carnivorous habits of some plants, and then enters upon the real subject of the lecture, viz., the fertilisation of plants by insects. It is most difficult to quote from a book where every page is alike interesting, but we cannot refrain from quoting to show the pleasantly simple language used, and language which so thoroughly conveys the author's meaning. Having explained the use of the different organs of a flower, in words and by illustrations, and their use in perpetuating their species, he says, on page 5 :—

"Everyone knows how important flowers are to insects; everyone knows that bees, butterflies, &c., derive the main part of their nourishment from the honey or pollen of flowers, but comparatively few are aware, on the other hand, how much the flowers themselves are dependent on insects. Yet it has, I think, been clearly shown that if insects have been in some respects modified and adapted with a view to the acquirement of honey and pollen, flowers, on the other hand, owe their scent and honey, their form and colour, to the agency of insects. Thus the lines and bands by which so many flowers are ornamented have reference to the position of the honey; and it may be observed that these honey-guides are absent in night flowers, where they of course would not show, and would therefore be useless, as for instance in *Lychnis vespertina* or *Silene nutans*. Night flowers, moreover, are generally pale; for instance, *Lychnis vespertina* is white, while *Lychnis diurna*, which flowers by day, is red."

Again, at page 9 :—

"The transference of the pollen from one flower to another is, as

already mentioned, effected principally either by the wind or by insects, though in some cases it is due to other agencies, as, for instance, by birds, or by water. For instance, in the curious *Vallisneria spiralis* the female flowers are situated on long stalks which are spirally twisted, and grow very rapidly, so that even if the level of the water alters, provided this be within certain limits, the flowers float on the surface. The male flowers on the contrary are minute and sessile, but when mature they detach themselves from the plant, rise to the surface and float about freely like little boats among the female flowers. Wind-fertilised flowers as a rule have no colour, emit no scent, produce no honey, and are regular in form. Colour, scent, and honey are the three characteristics by which insects are attracted to flowers."

Speaking of the white dead-nettle (*Lamium album*), at page 17 :—

"In the first place, the honey attracts insects. If there were no honey, they would have no object in visiting the flower. The bright colour is useful in rendering the flower conspicuous. The platform serves as an alighting stage for bees. The length of the tube has reference to that of their proboscis, and prevents the smaller species from obtaining access to the honey, which would be injurious to the flower, as it would remove the source of attraction for the bees, without effecting the object in view. The upper arch of the flower protects the stamens and pistil, and also presses them firmly against the back of the bee. So that, when the bee alights on the stage and pushes its proboscis down to the honey, its back comes into contact with them. The row of small hairs at the bottom of the tube prevents small insects from creeping down the tube and stealing the honey. Lastly, the small processes on each side of the lower lip are the rudimentary representatives of parts, formerly more largely developed, but which, having become useless, have almost disappeared."

Concluding the first lecture, Sir John says :—

"For it is obvious that any blossom which differed from the form and size best adapted to secure the due transference of the pollen would be less likely to be fertilised than others ; while on the other hand, those richest in honey, sweetest, and most conspicuous, would most surely attract the attention and secure the visits of insects ; and thus, just as our gardeners, by selecting seed from the most beautiful varieties, have done so much to adorn our gardens, so have insects, by fertilising the largest and most brilliant flowers, contributed unconsciously, but not less effectually, to the beauty of our woods and fields."

Lecture No. 2 is of great interest to the lepidopterist, for amongst other subjects the author seeks to show the use of the

colours and markings of various larvæ. This lecture is very fully illustrated both with woodcuts and by the coloured plate. After very fully discussing this subject, in conclusion he says:—

“I think we see reasons, for many at any rate, of the variations of colour and markings in caterpillars, which at first sight seem so fantastic and inexplicable. I should, however, produce an impression very different from that which I wish to convey, were I to lead you to suppose that all these varieties have been explained, or are understood. Far from it; they still offer a large field for study; nevertheless I venture to think the evidence now brought forward, however imperfectly, is at least sufficient to justify the conclusion that there is not a hair or a line, not a spot or a colour, for which there is not a reason,—which has not a purpose or a meaning in the economy of nature.”

The third and fourth lectures are devoted to Sir John Lubbock's favourite study, the habits of ants. These pages are most readable, for they treat of, amongst other economy, the food of ants, their modes of warfare, their slaves, division of labour, recollection of friends, agriculture among ants, powers of communication, and so many other senses and habits that we cease to wonder at the fascination this group of insects has for the author.

We cannot too strongly recommend this book to our readers, and no village library should be without it. Thoroughly scientific, it is written so popularly that it reads as easily as a story book. It is suitable alike for the school boy, the gardener, the farmer, the entomologist, and the general reader. In fact we cannot conclude our pleasant duty of noticing so charming a book without congratulating the author upon his happy thought of publishing these lectures.—J. T. C.

OBITUARY.

WILLIAM WILSON SAUNDERS, F.R.S., F.L.S., &c. — Mr. Saunders died at Worthing, September 13th last, in his seventy-first year, having been born June 4th, 1809. He was born near Wendover, Bucks, and was the second son of the Rev. James Saunders, the Vicar of Kirklington, Oxfordshire. Educated at Addiscombe, he eventually joined the Honourable East India Company's service as an engineer; but after a short absence of about a year, he returned to this country in 1832. Having devoted much of his leisure while in India to the study of Natural History, he brought back collections of insects and plants, and while there he published at least one scientific paper. Having married and

resigned his Indian post, he settled at Wandsworth, and joined his wife's father in business as an underwriter at Lloyd's; of which Committee he in time became Chairman, and a most able member. He was exceedingly successful in business and amassed a large fortune, only to be lost, when the firm of which he was the head suddenly failed in 1873. Prior to this date his ample means were always at the service of scientific research. It was he who gave impetus to the foreign collection of plants and insects. Had it not been for his liberality many successful collectors could never have forwarded home their rich stores of undescribed species. To this liberality and his ample means are to be ascribed his chief use to science; for his many business and other duties left him little time for actual scientific work. Nevertheless many valuable papers, on both Entomology and Botany, from his pen may be found in the 'Transactions' of the various learned Societies, of which he was a leading spirit. On the formation of the Entomological Society he was one of the original members, and at a later period was President of that Society on three occasions. In addition to the sciences mentioned, he long studied the economic value of various woods in regard to their durability, &c. His collection of these was shown in the Exhibition of 1851. In 1857 he removed his then extensive collection to Hillfield, Reigate, which later became so celebrated as the home of a man ever ready to help his less fortunate fellow-workers, by reference to his collection and his extensive knowledge. These collections rapidly grew until they had, in the unfortunate year 1873, attained a greater extent probably than any other privately made. They consisted of insects of all orders, dried plants, woods, birds, shells, &c., while his gardens contained well nigh every rare exotic plant which could be obtained. So great was his success in the study of horticulture that in 1868 he edited and published the first part of 'Refugium Botanicum,' with the assistance of Mr. J. G. Baker and Prof. Reichenbach for the descriptions; but many of the plates are from his own drawings, while others are by the well-known botanical artist, Mr. J. N. Fitch. Mr. Saunders also edited 'Insecta Saundersiana' and 'Mycological Illustrations'; in this latter he was assisted by Messrs. Worthington Smith and A. W. Bennett. Mr. Wilson Saunders was elected Fellow of the Royal Society in 1853, of the Linnean Society in 1833, was at one time a Vice-President of the Royal Horticultural Society, and was

founder of the Reigate Natural History Club. Nor was he a mere member of these and various other Societies, for he held important offices at one time or other in most of them. Since his failure in 1873, when his collections were distributed by sale, he had resided at Raystead, Worthing, and even up to a short time before his death adding to his already numerous contributions to the knowledge of horticulture by communicating several papers to the Royal Horticultural Society. The loss to Science by his death is great, for few men have done more, directly or indirectly, to give that impetus to the study of Natural Science which caused it to make such rapid strides during the prime of his life, than William Wilson Saunders.—J. T. C.

JAMES COOPER.—Mr. Cooper was born at Graysouthen, near Cockermouth, October 19th, 1792, and died, in the eighty-seventh year of his age, on August 1st, 1879, at Atherton's Quay, near Warrington. In his early life he was a handloom-weaver, and comparatively uneducated; but he soon removed the latter disadvantage by close study, and a closer observation of Nature in its wildest home,—the then little known, scientifically, mountain moorlands of his native county. In due course Mr. Cooper became an accomplished naturalist, excelling in Ornithology and Entomology. Living at a period when the fauna of these isles was less known than now, he added many new species to the British lists of birds and insects, *Petasia nubeculosa* and *Cerura bicuspis* being amongst the latter. Mr. Cooper was appointed curator of the Warrington Museum in 1848, then a very small representative of the few Natural History collections in the provinces. Here he remained until 1852, when he went to live at Preston for a second time, and afterwards spent some time exploring the little-known district of Rannoch. In 1855 Mr. Cooper returned to his post at the Warrington Museum, where he remained until 1874, when he resigned the curatorship. From this time until his death matters were not happy with him in a worldly sense, illness and misfortune sorely pressing on him. Many scattered records from his pen will be found in the Natural History works of his day, and Mr. Yarrell received much assistance from him when writing his works. Living at a period earlier than most of us can remember, he was little known to this generation, but in his time he contributed greatly to the knowledge of Natural History, and he was always one of Nature's gentlemen.—J. T. C.

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THE PAST YEAR.

By EDWARD A. FITCH, F.L.S.

BEFORE the recollection of entomological experience during the past extraordinary season passes away, it is well perhaps that a few notes should be preserved.

A winter of exceptional severity was followed by a sunless and chilly spring, and then by a summer and early autumn remarkable for excess of rain and deficiency of heat. The year was altogether persistently wet, sunless, and ungenial. The effects of such a season on insect-life have naturally been very marked. Statisticians tell us that we must go back as far as the year 1816 for a similar season, while others can only compare it with the records of 1764. A later year, 1860, which is in the memory of most of us, was peculiarly devoid of summer weather, though by no means so abnormal as 1879. It serves better, however, for comparison in entomological matters. The preceding winter of 1859—60 was protracted though not very severe, thus differing from that of 1878—9; still we find *Pieris napi*, *Phigalia pilosaria*, *Biston hirtaria*, &c., recorded as captured at large in January. The winter of 1860—61 was, however, exceptionally severe, and the summers of 1858 and 1859 had been exceptionally hot; the records of British captures of many European species relate to those years. The summer then of 1860 was a greater contrast to its predecessors than our late one. Comparing the two years, 1860 and 1879, entomologically, there is much in common. In the 'Entomologist's Weekly Intelligencer' (vols. 8 and 9), and 'Zoologist' (vols. 18 and 19), are constant notes on late appearances, and towards the end of the season the opinion that the year had been generally unprofitable was stoutly combated by several correspondents. Large takes of larvæ were especially instanced; various Hymenoptera, as wasps, *Bombi*, &c., are

spoken of as conspicuous by their absence, but the Coleoptera and Hemiptera do not seem to have suffered so much as the more sun-loving orders. As this year (1879) we have conspicuous exceptions to the general absence of insect life by the unwonted abundance of *Pyrameis cardui* and *Plusia gamma*, and a few other species, so in 1860; for in that year many specimens of *Deilephila livornica* were captured in the spring, and a few *Chærocampa celerio* in the autumn. Specimens of both have also been taken this year. Both then, as now, the abnormal absence or presence of various species, and their early or late appearances, were abundantly remarked upon, but in very few, if any, instances was a cause looked for. This is to be regretted, though we quite allow there are great difficulties attending the enquiry.

The past season has probably been the most disastrous on record in these islands. Crops of all descriptions are exceptionally poor and unmaturing; in many cases they have altogether failed to ripen. As regards honey "the results are absolutely *nil*, and where the bees have not been artificially fed they were last autumn and end of summer already perishing by thousands of starvation. Not one hive in fifty can possibly survive the winter if left to subsist on the honey collected during the past sunless summer. A summer entirely without parallel in apian annals." If we add to this gloomy state of affairs under domestication the immense nest-building difficulties of certain Hymenoptera in such a season, we can well imagine how severely all genera of bees and wasps have suffered.

Of late appearances in Lepidoptera it is useless to multiply instances; they have been abundantly referred to in the pages of the 'Entomologist': suffice it to say that here the first *Pieris rapæ* noticed was on May 5th, and the first *P. brassicæ* not till June 13th. All early summer species were about a month later; this was not only the case with insects, but the phenological observations collected by the Meteorological Society show it to have been the case with the flowering of plants and the leafage of trees. The pages of the 'Zoologist' and 'Field' confirm it more clearly by the records of the arrival of our migratory birds. Fish likewise have been affected, for many species have been altogether abnormal in their movements. The season was altogether fully a month late; the well-known St. Mark's fly (*Bibio Marci*), is particularly regular and short-lived in its

appearance at the end of April, whence its name (St. Mark's Day, April 25th). I only saw it on one day this year, and that sparingly, on May 14th. In some few instances periodicity is said to override the influence of temperature; in a paper on this subject (Trans. Ent. Soc. Lond., 3rd ser., vol. i., p. 63), Dr. Verloren especially mentions Swammerdam's and Réaumur's *Ephemeridæ*, and makes some very pertinent remarks on the appearance of several Lepidoptera.

The comparative abundance of certain species is of more interest. Butterflies generally have been scarce, and here I have not seen a single *Thecla* or *Lycæna* the whole year. *Thecla rubi* mostly occurs in my garden in the spring, and *T. W-album*, in some years, is not rare on the blackberry bushes in autumn. These inconspicuous species may possibly have been overlooked, but not so the brilliant little *Lycæna Icarus* and *L. Argiolus*, which I never before failed to see in numbers. Not one of either this year; and, curiously, not a single *Polyommatus Phleas* till September 10th. *Chortobius Pamphilus* has also been very rare; a few were noticed on June 19th, but no autumn specimens occurred. The *Pieridæ* have been by no means common; August 24th was the only day on which they were seen in any quantity. *P. brassicæ* has been rare throughout, but from North Germany we hear of swarms of this species occurring towards the end of August, whence they travelled southwards. I saw a few *Gonepteryx rhamni*, both hybernated and fresh individuals, but all males; hybernators occurred till June 28th. Of *Colias Edusa* I found one most dilapidated female on September 26th, flying—or rather trying to fly—at ten minutes past five in the afternoon. I confined this over some growing and blooming white clover (*Trifolium repens*), hopeful of eggs, but had no success; it was found dead on September 29th. This is the only living *Colias* I have seen since 12th December, 1877, although it has occurred in many localities this year. The *Vanessidæ* and *Satyridæ* have been generally common, with but few *Hesperidæ*. The lessons learned from our British butterflies would be that those species which were exposed pupæ (*Pieridæ*) throughout the winter suffered greatly from natural enemies, as birds, woodlice, &c., owing to the scarcity of other food, while the larval and imago hybernators (*Satyridæ* and *Nymphalidæ*) were fairly safe, owing to the unbroken continuity of the cold.

The great entomological event of the past year has been the extraordinary abundance of *Pyrameis cardui* and *Plusia gamma*. The causes of this, however, are not inherent to this country, as both were migrants here, coming originally we know not whence, though probably from somewhere in Africa. The swarm, starting from N.W. Africa, was observed at Algiers as early as 15th to 20th April, travelling in a north-easterly direction; it reached the neighbourhoods of Valencia and Barcelona by April 26th to 30th, spread over Spain, touching the Balearic Isles May 1st to 3rd, and crossed the Eastern Pyrenees on May 26th and 27th. It was distributed over South-east France, Switzerland, and North Italy, and on the morning of June 5th thousands of living specimens were found on the snow at the Hospice of St. Gothard. It then spread over Germany and Austria, being recorded in the various localities on dates varying from the 7th to 16th June. Another column crossed the Mediterranean to Sicily, and spread itself northwards over Italy in June. The more westerly end of the migratory swarm reached Strasburg as early as 3rd to 9th June, Bisheim (Alsace) on June 8th, Angers and Rennes, in France, on June 10th. Paris and its environs were not apparently reached till June 15th. It arrived on our south coast on June 10th, whence it spread throughout the three kingdoms; specimens first noticed here (Maldon) on June 13th. Although I have spoken of this extraordinary and unexplained migration in the singular, it is not to be supposed that the multitudes of specimens came all in one column; we have direct evidence to the contrary. Its tracing does not altogether rest with British entomologists; we know that the swarm was far from exhausted when it reached these shores, and *P. cardui* has occurred almost everywhere in the greatest profusion, though possibly not in such immense numbers as occurred along the Rhine, where in many localities its resultant larvæ became a destructive pest to the cultivators of artichokes and *Artemisia*. Many interesting hypotheses have been started to account for this true case of butterfly migration, which is not altogether a new thing with *P. cardui*. None appear altogether satisfactory. *P. cardui* is the most widely distributed of all lepidopterous insects, and follows the general rule of the animal and vegetable kingdoms, that "the most widely spread species are those capable of withstanding the greatest climatic changes and adapting themselves to the greatest diversities of topography."

This species has, however, always been remarkable for the uncertainty of its appearance; in some years even for its total absence in localities where it had previously been abundant. The greater part of our June specimens were doubtless immigrants, and the summer and autumn specimens their progeny. I found the larvæ commonly early in August, in their curious spider-like webs, on *Carduus arvensis*, but much more generally on those isolated thistles amongst the corn which this year have been so abundant. On the Continent almost every species of thistle and even the common nettle (*Urtica dioica*), have afforded food for the numerous larvæ. My first bred specimen pupated on August 9th, and emerged on 14th. I lost my three late pupæ by introducing *Thamnotrizon cinereus* into the cage, who soon devoured them. This was not my only loss through these insectivorous practices, for I collected some thirty or forty larvæ of *Stratiomys*, which have been unusually common this year, and all of them became the prey of two specimens of *Gammarus pulex*, which had inadvertently been introduced into the aquarium. I had hoped to have bred the pretty chalcideous *Smicra*, which is parasitic on these curious aquatic larvæ. Although these larvæ were so common I only saw one imago, and that was a specimen of *Stratiomys furcata*, which I captured on a wild parsnip bloom on August 15th.

In many of the numerous notes on the extraordinary abundance of *P. cardui*, it has been remarked how *Plusia gamma* appeared to accompany it in its migrations. This has been equally observable throughout Britain, where both species occurred on our coasts simultaneously; although the imagos of *P. gamma* have occurred in the greatest profusion we have but few records of the larvæ in these islands. There is one notable exception (Entom. xii., 222). It is far otherwise on the Continent, for thence, where this larva is by no means an unknown destructive, we have deplorable news of its serious depredations amongst clover and lucerne, and particularly flax and peas. I have found imagos of *P. gamma* from January to December; indeed it is a question in which state this species hibernates, and larvæ of *Pyrameis cardui* have been found in this country as late as October (Entom. xi., 19); both species can indeed withstand great climatic changes. Some few other species of Lepidoptera have been unusually common; here, as in many other localities,

Abraxas grossulariata has swarmed in altogether unprecedented numbers. During the first fortnight in June the larvæ were particularly abundant on the blackthorn hedges, and so continued for some time. Contrary to all previous experience, although I made repeated search both in my own and other gardens, not a larva was to be found on either gooseberry or currant. The first imago was captured on July 24th, larvæ being still abundant, and imagos continued more or less common until September 19th. *A. grossulariata* hibernates quite exposed as a very young larva. Mr. Silcock's (Entom. xii., 20) and other notes appear to refer to some abnormal second brood. At the September meeting of the Entomological Society Mr. W. C. Boyd referred to the extraordinary abundance, presumably of the second brood, of *Anaitis plagiata*; this also has a hibernating larva. I have found *Odonestis potatoria* especially abundant, both as larvæ and imagos, and many other species, e.g., *Lithosia quadra*, *Emmelesia decolorata*, *Eupithecia expallidata*, &c., have been noticed in these pages. I found *Sesia myopæformis* very abundant, with *Cossus ligniperda* and *Zeuzera æsculi* common, as usual, though late; these and other internal feeders are probably but little subject to climatal conditions in their earlier stages. Many familiar Lepidoptera I have altogether missed this year. *Pygæra bucephala* larvæ often quite defoliate certain elm trees and sallow bushes near here; this year I have not seen the species in any stage. Almost the same remark will apply to *Bombyx neustria*. Plum pies, especially of the black damson variety, have been particularly enjoyable this autumn by the knowledge that the unsavoury larva of *Opadia funebrana* altogether *non est*; neither have I seen the closely allied *Carpocapsa pomonana*, although the imagos were perhaps more than usually common last July. As an instance of unusually early appearance I may say I bred a single specimen of *Eupæcilia vectisana*, indoors though, on June 12th.

Miss E. A. Ormerod has already made some remarks on the effect of temperature on insect development in our June number, and in a paper read before the Entomological Society (Trans., 1879, pp. 127—130). In discussing this latter paper Mr. Stainton remarked on the sufferings of certain leaf-mining lepidopterous larvæ. I could mention the absence of many other species, but one other instance will here suffice. I know a mill on the

borders of this county where *Mania maura* occurs in August by hundreds; flying over the water at the head of the mill in the evening, with its peculiar bat-like flight, and resting within the mill by day. I have seen them thus, packed on one another in immense numbers. This year not one has been seen. On the weather-boarding of this same mill I have usually seen and disturbed, in order to witness moth-hawking in its glory by the numerous swifts and swallows, every morning some eight or ten *Catocala nupta*; this year but two have been seen.

Leaving the Lepidoptera, one or two notes on experience of this miserable season amongst the more neglected orders may be instructive. Coleopterists, when industrious, regardless of weather, do not appear to complain of want of success. In an order where life-histories and habits are particularly variable this might be expected. With me but two extraordinary occurrences in this order have been noticed; these were the excessive abundance of *Anchomenus dorsalis* and of *Orchestes alni*. The foliage of most of the elm trees here appeared to be completely scorched owing to the ravages of the *Orchestes* larvæ; it was remarked generally. With the more sun-loving Hymenoptera the experience is just the opposite; this year follows two or three very bad ones, but in 1879 many species and even genera have been quite unnoticed. *Aculeata* generally have found seasons sadly out of joint; certain *Bombi* have been scarce, and I have seen but two wasps, both *Vespa germanica*. Hymenopterous galls have been generally scarce, more especially the willow and sallow sawfly (*Nematus*) species. Other sawflies have varied: to take two well-known garden species as examples; the larvæ of *Nematus ribesii* (the gooseberry grub) have been exceedingly destructive to currant and gooseberry bushes, as they were in 1860, while the cherry- and pear-loving larvæ of *Eriocampa* (*Selandria*) *adumbrata* have hardly made a sign, though usually so abundant. Of these two pests my experience is that *E. adumbrata* always spins its winter cocoon much deeper in the ground than *N. ribesii*; neither change to pupæ till the spring. The Cynipid galls have all been remarkably late in appearance. The first gall I found was that of *Andricus curvator* on June 2nd; the common oak-currant galls of *S. baccarum* were not noticed till 11th June, and the first *Spathegaster* bred on June 16th. In 1878 these galls were common on May 1st, and the *Cynips* occurred generally by

May 25th. Oak-apple day (May 24th) came and went without a possible oak-apple; even the oak-buds themselves did not show. The first specimen of this gall (*Andricus terminalis*) I found was on June 16th; they have been very rare this year, quite a contrast to last. Then (1878) some specimens were full grown as early as May 9th, and in 1874 this happened as early as April 25th. The galls of *Dryophanta divisa*, generally so abundant, are quite absent this year, though the leaf-spangles (*Neuroteri*) are fairly common. Amongst the Hemiptera, *Aphides* and many of the true bugs have been fairly washed away; nearly all species have been very rare; hardly a single instance of destructive (plant-) "louse" attack has occurred; and my prophecy as to *Siphonophora pisi* was happily altogether falsified (Entom. xii., 196), though the peas perished all the same. The troublesome *Thripidae* were first noticed on August 10th, and were only worrying on August 24th; the predaceous *Orthoptera* have doubtless fared well by reason of their food being so easily procurable. *Acrida viridissima* has been common, and *Thamnotrizon cinereus* has been exceedingly abundant. About the middle of June I saw several *Platetrum depressum* here for the first time, and on August 22nd it was quite a glorious sight to see the hundreds of the beautiful Demoiselle (*Calopteryx virgo*) flitting about over the Essex and Suffolk Stour, near its source. The lazy *Limnophilus lunatus* and *L. affinis* have been complete pests; indeed all aquatic insects, as might be expected, have felt but little ill effects from the generally pluvial season, but the floods have very probably tended much to their distribution in localities where in dry years their struggle for existence will be severe indeed. Many of the neglected Diptera, with some few of the smaller Hymenoptera, together with a sprinkling of the larger Ichneumonidæ, such as *Ichneumon sarcitorius*, *Paniscus testaceus*, *Pimpla instigator*, &c., have been quite abundant, and but for them insect-life would truly have been conspicuous by its absence. Great as is the wheat crop failure this year, little, if any, of the damage is attributable to *Cecidomyia tritici* (Entom. xii., 207); the various galls of *C. rosæ*, *C. trifolii*, *C. urticæ*, and *C. persicariæ* have occurred in unwonted abundance, and the larger *Tipulæ* have been especially common and troublesome, through their lethargic habits; the first imago of *Tipula oleracea* occurred on September 5th, and they became generally common from 10th to 12th.

Speaking of 1860 the Rev. O. P. Cambridge remarked that "moisture is less hurtful to spiders than insects in general." (Zool. 7553). This has again been abundantly proved this year. All families of spiders appear to have increased and multiplied astonishingly; one non-entomological acquaintance was quite solicitous for their welfare, seeing the paucity of hexapods on which they were to prey.

Such are a few of the entomological experiences of 1879. Insect economy is so varied that it is hard to assign even probable causes for many of these anomalies; still from such a season there is much to be learned. First, however, we must bear in mind that by reason of the adverse meteorological conditions many species have occurred, though quite unnoticed; absence of sun and presence of rain have been altogether unfavourable for their appearance. Last winter was exceptionally severe, but this, I believe, was rather favourable to insect preservation than otherwise. Severe and continued cold destroys but few species directly. To this end we have had many experiments on eggs, larvæ, pupæ, and imagos. John Hunter found that although insect eggs solidified at 15° Fahr., they were not destroyed. Spallanzini is even said to have subjected these eggs to a cold of 56° below zero, and then found that some hatched. Of larvæ we have numerous instances of their being rendered quite brittle by frost and still surviving; indeed it has been recommended that certain hybernating larvæ be kept throughout the winter in an ice safe to ensure successful rearing. A *modus operandi* in which is great reason. Pupæ also have been repeatedly observed to develop successfully after having been frozen to the consistency of ice, but on this subject Mr. W. H. Edwards' somewhat imperfect experiments on the effect of cold causing a change in form may be referred to (Can. Ent. ix., 203).

Réaumur's experiments on the retardation or acceleration of metamorphosis are well known. Mr. McCook's and numerous other experiments on bees and ants have proved that hybernating imagos readily withstand great cold without any apparent injury. From these facts long-continued cold during the period of hybernation cannot be said to be injurious to insect life in any stage. Sharp winters are preservatives generally; it stays spoliation by birds and numerous other enemies. During mild winters the underground pupæ and hybernating larvæ are easily

found and preyed upon, not so when the surface is covered with snow or frozen hard; though exposed pupæ, &c., are then the more eagerly sought after and obtained. Last winter I had a specimen of *Depressaria Alstræmeriella* in a certain place, which never moved from November, 1878 (it was possibly there somewhat earlier) until April 8th, 1879. Imperfect or disturbed hybernation is always destructive; that is, the application of cold after vitality is resumed by the hybernator is mostly fatal. Of this I have experienced several instances, and it is on this principle the ice-house treatment of hibernating larvæ is recommended. Late and severe frosts after mild weather are far more destructive to insect life than a persistently hard winter. In the 'Entomologist's Weekly Intelligencer' (vol. ii., p. 21), Mr. H. Cooke recorded a curious instance of these injurious effects of sudden cold. He says—"On 10th April, 1857, at two o'clock, the thermometer was 80°, and white butterflies were plentiful; on the 11th, at the same hour, the thermometer was down to 50°, and many butterflies were picked up dead." Wet is, I think, a much greater enemy to insect-life than cold; all breeders of Lepidoptera know the deleterious effects of excessive damp on pupæ. Larvæ also suffer greatly from disease occasioned by excessive moisture in their food. This year, however, great quantities of insects have been actually drowned, although there are people who believe the fact of drowning an insect to be an impossibility. In walking over a twenty-acre field of red clover, on August 20th, I picked up fourteen specimens of *P. gamma* larvæ from the flooded furrows; these were quite hard and distended. I carried them home carefully, but not one recovered. The total destruction of these larvæ in this field alone by the heavy rain must have been considerable.

From the above remarks it will be gathered that the wet summer has altogether had much more effect on insect-life in 1879 than has the severe winter; scarcity of imagoes this year, however, will not serve as sufficient data on which to forecast a like scarcity next, though the ungenial pairing-time may have its effects on many isolated species. As in 1860, so in 1879, many lepidopterous larvæ have occurred in unwonted abundance. I could mention many species; in one garden quite a plague of *Arctia lubricipeda*, *A. menthastri*, and *Mamestra persicariæ* had eaten up every green thing, and were feeding on ivy, laurel, and

clematis when I saw them; their numbers must have been enormous. The fact, too, of pupæ remaining dormant through more than one season is every year becoming more established. The different entomological experiences of every season are of interest, and it is this which has induced me to pen these rambling notes.

Maldon, Essex, November, 1879.

ANATOMICAL AND MORPHOLOGICAL RESEARCHES ON THE NERVOUS SYSTEM OF INSECTS.

Translated from the French of M. ED. BRANDT in the 'Comptes Rendus.'

By J. W. SLATER.

THESE researches have been effected on 1032 species belonging to different orders of insects, as well as on a great number of larvæ. They bear upon the metamorphoses of the nervous system in fifty species, and are destined as elements for the comparative anatomy, and especially for the morphology of this part of the organism of insects. The following are the principal novel results:—

1. Certain insects, such as the genera *Rhizotrogus*, *Stylops*, *Hydrometra*, have not a distinct sub-œsophagian ganglion. Hitherto it was supposed that this ganglion was distinct from the following ganglia in all insects, and this character was considered as distinguishing their nervous system from that of the other *Arthropoda*.

2. The "pedunculated bodies" of Dujardin, or the convolutions of the brain, are found not merely in some insects, as hitherto admitted, but in all, in a higher or lower state of development.

3. In certain insects differences in the development of these convolutions are met with, even in different individuals of the same species. This is the case, *e.g.*, among the social Hymenoptera, such as ants, wasps, and bees. The assertion of Mr. Wagner that among bees these parts are found in the females and the workers, but not in the males, is inexact. They are found in the males, not only of bees, but of all insects. Nevertheless, among social species the development of these organs is much less considerable than in the females and workers.

4. In general the development of that part of the brain

known as the hemispheres is proportional to the degree of development of intelligence and of manners, but that of the entire brain is not so.

5. The nerves of the labrum do not, as commonly admitted, issue from the lower surface of the super-œsophagian ganglion.

6. The study of insects having two thoracic ganglia shows that in some the first ganglion is simple, and corresponds to the first ganglion of the larva. The second is compound, resulting from the fusion of two or three thoracic ganglia of the larva with one or two of the abdominal ganglia. This is the case with the Lepidoptera, Coleoptera, Hymenoptera, and Neuroptera. In others both the first and the second thoracic ganglia are compound, the former resulting from the fusion of the first and second thoracic ganglia of the larva. (*Empis*, *Thereva*, *Asilus*, *Bombylius*).

7. The number of ganglia varies not merely in different species of insects, but even in different individuals of the same species. The working bee has five abdominal ganglia, whilst the males and the queen have only four; the working wasp has five ganglia, whilst the males and the queens have six.

8. Hitherto it has been supposed that the last abdominal ganglion is always complex. I have often found that the last but one is formed by the union of several, while the last is simple. (In the working bee, in *Mutilla*, &c.)

9. In certain insects (*Tenthredo*, *Bombus*), there exists in the thorax a sympathetic nervous system whose constitution corresponds to that of the abdomen in these insects.

10. The transformation of the nervous system takes place according to two different types; sometimes it contracts, and the number of ganglia is reduced in the adult (Hymenoptera, Coleoptera, Lepidoptera); sometimes the change follows the inverse direction, that is to say, in the larva there is only one single mass in the centre of the thorax (in addition to the sub-œsophagian ganglion), and this mass is broken up into a variable number of others, as M. Künckel has shown in *Volucella*, and as I have demonstrated in a great number of species (*Eristalis*, *Volucella*, *Stratiomys*, &c.)

11. Comparative researches made on the nervous system of the Hemiptera show that when these insects have only a single thoracic ganglion it corresponds to the two hinder thoracic

ganglia, and all the abdominal ganglia of the larva. The first always coalesces with the sub-œsophagian ganglion. (*Acanthia*, *Nepa*, *Notonecta*, &c.)

12. My researches on the nervous system of the Lepidoptera show that these insects have sometimes two, sometimes three, thoracic ganglia; but that they have always only four abdominal ganglia, as stated by Léon Dufour. In many recent zoological manuals is found the erroneous assertion that Lepidoptera have five abdominal ganglia. According to my researches upon 118 species three thoracic ganglia are found in *Hepialus* only,—a genus containing species many of whose organs resemble those of a chrysalis rather than those of an adult insect.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

LEPIDOPTERA AT YARMOUTH AND LOWESTOFT.—During a fortnight's stay in the neighbourhood of Yarmouth, from August 17th to 30th, I had plenty of opportunity of remarking two things—the continued lateness of the season, and the great abundance of *Plusia gamma*. This handsome and ubiquitous insect was on the wing in great numbers: on the sand dunes, where the dandelion and sea-holly formed the chief attraction to its insatiable appetite for sweets, there it was, and in nearly every lane in Suffolk through which I walked. I suppose everyone must have noticed the way the imagines have varied in ground colour this season. I have both bred and seen at large specimens nearly as rosy as *Plusia V-aureum*; and the last imago which emerged from the pupa in my cage was shot with bronzy green. I am happy to be able to add that neither the gardens which I passed nor the hedgerow plants appeared to have suffered seriously from the depredations of the larvæ, but, on the contrary, looked fresher and greener than I have ever seen them before at this time of year, while flowers of all sorts were out in abundance; dock, plantain, and burdock, were the only weeds which showed many traces of their voracious appetites. As several notes have lately appeared in the pages of the 'Entomologist,' which seem to point to a scarcity of other species of Lepidoptera, I venture to append a list of those I observed, from which it will be seen that the lateness of the season continued apparent in Suffolk up to the

date of my departure; and no wonder, for the weather was most unsettled. *Vanessa urticæ*.—Just out, August 18th; not seen after August 22nd. *V. Atalanta*.—Just out, August 29th. *Pyrameis cardui*.—Not very common. *Satyrus Megæra*.—Just out, August 29th. *S. Janira*.—Still coming out when I left, but not common. *S. Tithonus*.—Abundant. *S. Hyperanthus*.—Not so common; nearly over when I left. *Polyommatus Phlæas*.—One or two on the North Denes, August 24th, frequenting sea-holly, in company with *Pyrameis cardui* and *Plusia gamma*. *Macroglossa stellatarum*.—One full-fed larva on the denes near the Yare, on rest-harrow. *Euchelia jacobæ*.—Larvæ not common; only occurring in one lane. *Arctia lubricipeda* and *A. menthastri*.—One small larva of each. *Liparis auriflua*.—Several at rest on twigs. *Orgyia antiqua* and *Bombyx rubi*.—One larva of each. *Odonestis potatoria* and *Selenia illunaria*.—One female of each. *Acidalia scutulata*, *A. trigeminata*, and *Timandra amataria*.—One of each. *Abraxas grossulariata*.—Commoner at rest in some of the lanes than I have ever seen it before in such situations. *Eupithecia centaureata* and *E. coronata*.—One of each at rest on a wall. *Melanippe unangulata*.—One near Bradwell, Suffolk, August 21st. *M. fluctuata*.—Only a few. *Coremia ferrugata* and *C. unidentaria*.—One or two of each. *Camptogramma bilineata*.—Still out, but rare. *Eubolia lineolata*.—Common, and in good condition when I first reached Yarmouth, but very local; confined to a sand dene between the Nelson column and the River Yare. I saw a very handsome dark-banded variety, and managed to obtain eggs; it appeared over by August 30th, but I saw two as late as the 28th. Mr. Wilson, in his work on the British larvæ (p. 128), gives June as the latest month in which this lively little insect appears on the wing. *Bryophila glandifera* and *B. perla*.—A few of each, at Gorleston. *Acronycta psi*.—A few at rest in good condition as late as August 21st. A distinguished looking feminine member of the *Leucaniidæ*, whom I met with one evening on the North Denes among the marram and lyme-grass, and whose sole object in life appeared to be that of digging for herself an early grave in the sand as speedily as possible, seemed to me to be more like *Nonagria elymi* than any other British species. She was gyrating round and round on her head with great velocity, and had already formed a considerable depression in the sand when I came across her. I also saw

a few very worn-out members of the *Miana* fraternity, whose scales were in much too "fishy" a state for me to care to pronounce on their identity. *Agrotis valligera*.—A few on the denes. It is an odd thing to see this insect at rest: it merely depends from the very tip of a blade of grass attached by the ends of its legs, and swayed to and fro by the slightest breeze. Besides the above I may mention that I was much surprised to observe a very fine specimen of a handsome *Vanessa*, to which I cannot attach a name. It was at rest on the trunk of a tree in a plantation, near Lowestoft, with fully expanded wings. It was about the size of *Vanessa polychloros*, and resembled *V. xanthomelas*, as figured in Mr. Kirby's work, now in course of publication (plate 7, fig. 1), in having a shaded greyish border to all the wings; but then the ground colour, so far from being redder than that of *V. polychloros*, was much more delicate and fawn-coloured. Unluckily it was out of reach, and I was without a net (August 18th).—B. LOCKYER; 27, King Street, Covent Garden, W.C., September 8, 1879.

APPEARANCE OF INSECTS DURING THE PRESENT SEASON.—The effects of the ungenial weather upon different species of insects vary greatly. Those which pass the winter in the mature state, such as *Vanessa Io*, *V. urticae*, and *G. rhamni* appeared this year quite as early as usual. *Anthocharis cardamines*, on the other hand, was in the Aylesbury district a month behind its time, having been seen from the 5th to the 25th June. *Hipparchia Janira* was not seen till July 18th, and *H. Tithonus* not till August 7th. Many of the commonest species, both among Coleoptera and Lepidoptera, are this year conspicuous by their absence. It must, however, be remembered in the Vale of Aylesbury, from the cold, wet character of its soil, and from its height above the sea-level, all periodical organic phenomena are exceptionally late.—C. R. SLATER; 18, Wray Crescent, Tollington Park, N., September, 1879.

LATE LARVÆ OF PYRAMEIS CARDUI.—I have been taking on our cliffs, to-day, what I believe to be the larvæ of *Pyrameis cardui*, some of them very small, feeding on the common mallow (*Malva sylvestris*). I do not think so late a brood has ever before been recorded.—WALTER BLACKALL; 9, Church Street, Folkestone, October 15, 1879.

NOTES FROM THE NEW FOREST.—As there seems to have

been a great deal of interest manifested lately in the Lepidoptera of the New Forest, I wrote to George Gulliver, of Brockenhurst, who collects in the district the greater part of the year, and asked him what his experience had been, as I had not been able to visit the Forest myself. He says that in some parts the larvæ of *Lithosia quadra* (as already noted by several correspondents) were in swarms; the perfect insects, however, were not plentiful. The whole question of the sudden appearance of the *L. quadra* larvæ in such large numbers calls for explanation. It is possible that the damp in the early part of the season may have caused a luxuriant growth of the lichens on which they feed, which both fed and sheltered the larvæ while small; the continued wet, however, probably prevented their pupation, or destroyed them in the pupa state. The fact that such large numbers of insects were bred in confinement from the larvæ taken would seem rather to prove that this was the case. *Calligenia miniata* was fairly abundant, and also *Aplecta herbida*, while *Plusia gamma* swarmed, as it has done in most places. *Catocala sponsa* and *C. promissa* were both scarce; they were also scarce last year, but swarmed the year before that (1877). Two *Acronycta alni* were taken at least, but the rarities seem to have been few and far between. Of *Eulepia cribrum* only two specimens were taken, although in some years it is fairly plentiful in one or two localities. Everything was three or four weeks late in the Forest, and both day-work and sugaring were unproductive. Taking the whole season Gulliver says that it is the worst that he ever knew; one would expect to hear this, but the accounts from some parts of the country are by no means bad. One of our best known collectors of Micros told me, a few days ago, that in spite of the wet he had done better this year than ever before, and I know of others who have fared by no means badly.—W. W. FOWLER; Repton, Burton-on-Trent, November 12, 1879.

ASTHENA SYLVATA.—To-day I have been beating alder between Plym Bridge and Cann Quarry, trying to obtain larvæ of *Asthenasylvata*. After beating several hours I gave it up in despair, not having obtained a single specimen. Ten days since I beat out one, which was full fed and went down on the 14th. Last year I had only one, which was not full fed until the 29th. I then walked to Cann Carn, and in the brake close by, and away from any alder, I commenced beating blackthorn (*Prunus communis*), and

the first stroke brought down *A. sylvata*. After some further labour in the same vicinity I obtained two more. I think this is the first record of its feeding on blackthorn.—G. C. BIGNELL; Stonehouse, September 22, 1879.

CAPTURES AT BOX HILL DURING JULY AND AUGUST.—The little *Phoxopteryx comptana*, generally so common on the slope of Box Hill at the end of May and early in June, was this year conspicuous by its absence; and of *Eriopsela fractifasciana*, usually plentiful in August, I did not see a specimen. The following are the best of my captures:—*Sesia ichneumoniformis*, *Setina irrorella*, *Corycia temerata*, *Retinia duplana*, *Lithosia aureola*, *Eupithecia subumbrata*, *Acidalia ornata*, *Aspilates gilvaria*, larvæ of *Scotosia dubitata* (from which I reared a fine series), larvæ of *Cucullia verbasci* (common) and *C. lychnitis* (rare, on *Verbascum nigrum*), *Pyrausta punicealis*, *P. ostrinalis*, *Botys hyalinalis*, *Spilodes palealis*, *S. cinctalis*, *Scopula ferrugalis*, *Homæosoma binævella*, *Phycis adornatella*, *Rhodophæa consociella*, *R. tumidella*, *Halias quercana*, *Sarrothripa Revayana*, *Tortrix corylana*, *Peronea aspersana*, *Phoxopteryx comptana* (1), *Sericoris conchana*, *S. cespitana*, *Sciaphila pasivana*, *Carpocapsa grossana*, *Semasia rufillana*, *Ephippiphora trigeminana*, *Catoptria hypericana*, *Dicrorampha plumbagana*, *Eupæcilia flaviciliana*, *Cochylis francillana*, *C. dilucidana*, *Coleophora lixella*, *C. onosmella*, *C. discordella*, *Elachista Bedellella*, *E. stabilella*, *Coriscium citrinella*, *Pterophorus acanthodactylus*, *P. baliodactylus*, *P. parvidactylus*, *P. tetradactylus*, *P. phæodactylus*. In June the plants of dropwort (*Spiræa filipendula*) were tenanted by larvæ of *Peronea aspersana* and *Gelechia tæniolella*, the former of which I bred in some numbers in July, the latter sparingly. A Noctua larva on the same plant produced, to my great surprise, a fine dark specimen of *Xanthia aurago*, an insect I hitherto believed was confined to beech.—W. MACHIN; 22, Argyle Road, Carlton Square, E., September 25, 1879.

CANTHARIS VESICATORIA. — Referring to Mr. Perkins' note (Entom., p. 274 *ante*), the Spanish-fly, or blister-beetle, is not so rare in this country as some imagine. It is found in several places in the South of England, and may be considered completely naturalised. I took it in abundance from an ash tree (*Fraxinus excelsior*), on the leaves of which it was sunning itself, in the month of June, about four summers ago, in a small wood near

Colchester; and though I have not since looked for it, I have no doubt but that it may still be taken there abundantly at the proper season. It may be of interest to state that the beetle is about three-quarters of an inch in length, and its colour is very beautiful bright metallic green.—GEO. J. GRAPES; 2, Poronall Crescent, Colchester, November 6, 1879.

GRANARY WEEVILS.—If further evidence be wanted of the excessive damage caused by *Calandra* (*Sitophilus*) *oryzae* and *granaria*, we find it in a recent parliamentary report "On Indian Wheat," by Dr. Forbes Watson. In this instructive and exhaustive report we read:—"As will be seen from the figures noted below, more than one-half of all the samples were found on arrival to be more or less damaged by weevil. Of the 325 samples entered as lost or otherwise unfit for valuation the great majority were found to be unfit for valuation on account of excessive weevilling. Only 497 samples out of a total of 1152 were in a perfectly sound, or at any rate nearly sound, condition." The samples from Bombay and the Central Provinces appear to have been in the soundest condition, while those from Punjab and Sind were more greatly damaged. In tracing the cause of this great deterioration in the samples Dr. Watson clearly tells us that many of them were already weevilled before they left India. "The Bengal samples, for instance, were packed each in a hermetically-sealed tin case, so that no weevil could have found access to them during the voyage, and yet out of 117 samples 70 arrived more or less weevilled." The introduction of comparatively simple screening and dressing machinery, also to a certain extent of the more expensive steam threshing machinery is recommended; for "in this manner," says Dr. Forbes Watson, "one of the greatest obstacles to the development of the Indian wheat trade would be reduced to a minimum." The total production of wheat in India is quadruple that of the United Kingdom, and is also of excellent quality.—EDWARD A. FITCH.

ANNUAL EXHIBITION OF THE HAGGERSTON ENTOMOLOGICAL SOCIETY.—The Eleventh Annual Exhibition of the Haggerston Entomological Society was held at the Society's Rooms, at Haggerston, on the evenings of the 13th and 14th November. There was a large attendance each evening. By far the greater portion of the exhibition was as usual composed of Lepidoptera,

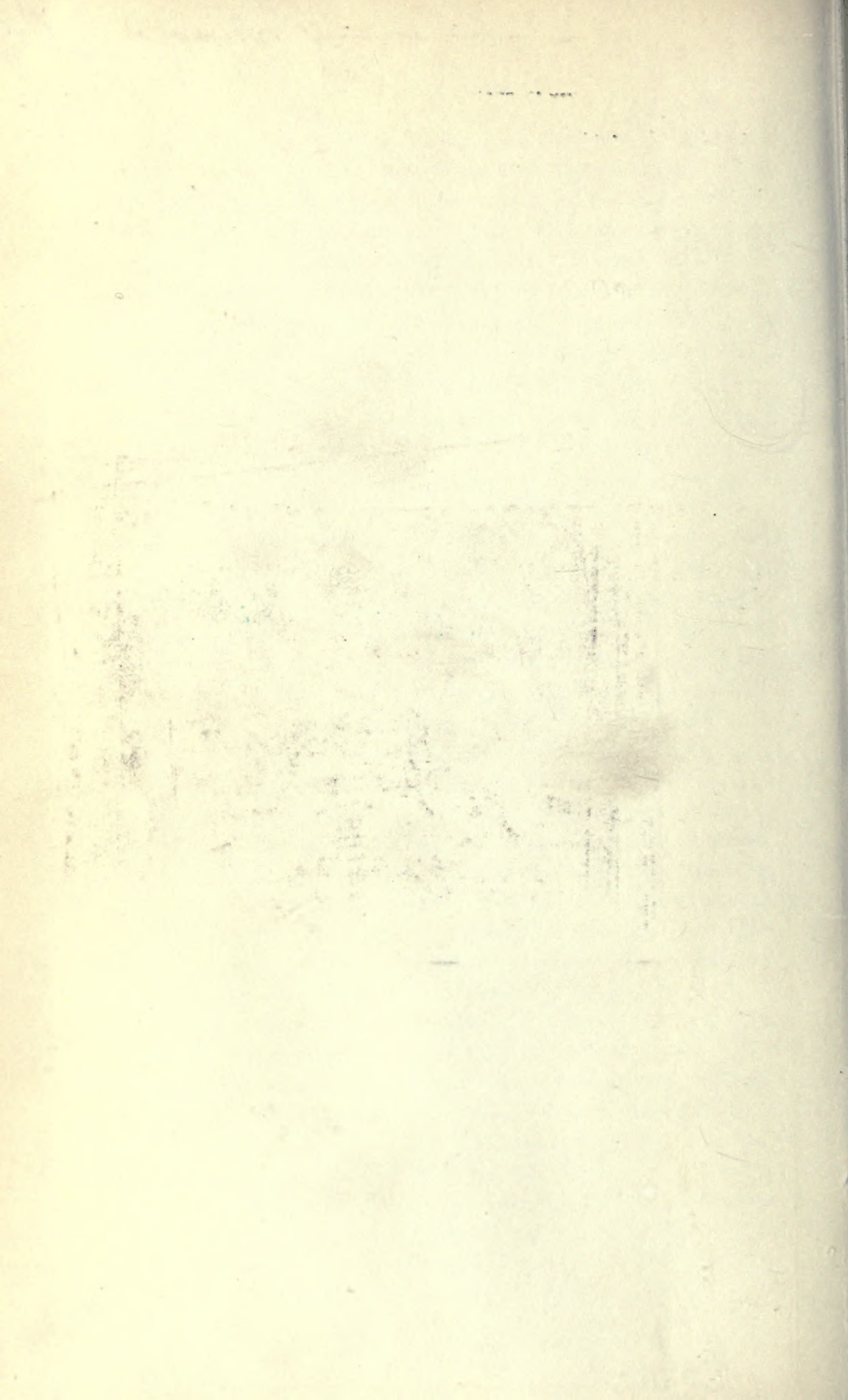
chiefly exhibited by Messrs. Barlow, Harper, Mardle, Southey, Pratt, Clark, Jobson, Meecham, Eedle (sen. and jun.), Raine, Hockett, Franklin, Meek, Smith, Lovell, Booth, Simmons, Trew, Downes, Rose, Pearson, and Gates. The following exhibits may be mentioned as being of exceptional interest:—By Mr. Jobson, a very light variety of *Satyrus Janira*; Mr. Lovell, *Acronycta alni* and *Stauropus fagi*; Mr. E. G. Meek, long series of *Dianthæcia Barrettii*, two *Platypteryx sicala* and larvæ, larvæ and five specimens of *Agrotis Ashworthii*, *Acronycta strigosa*, and *Boletobia fuliginaria*; Mr. Southey, several varieties of *Cidaria russata*, &c.; Mr. E. Franklin, variety of *Scotosia certata*; Mr. Simmons, *Aglossa dimidialis* (imported, taken at the East India Docks) and *Tinea orientalis* (also imported); Mr. Rose, hermaphrodite specimen of *Lycæna alexis*; Mr. Purdy, *Diasemia ramburialis*, *Argyrolepis Mussehliana*, &c.; Mr. Bryant, black variety of *Biston hirtaria* and *Bombyx quercus* var. *callunæ*; Mr. J. A. Clark, a fine variety of *Pyrameis cardui*; Mr. T. Eedle, sen., exhibited a large and greatly-admired case of preserved larvæ, representing four families of Lepidoptera, *Diurni*, *Geometræ*, *Nocturni* and *Noctuæ*, and numerous other cases and drawers; Messrs. Hockett, Hillman, Raine and Franklin, also exhibited largely in this branch. The Coleoptera were represented by Messrs. H. Hillman, G. Pearson, and W. J. Vandenburg. Messrs. Pearson and Vandenburg also exhibited small collections of Neuroptera. Mr. H. Hillman, F.Z.S., also exhibited two cases containing coloured plaster-casts of fruit, &c., showing the way in which apples, pears, and various vegetables are attacked by insects. This exhibit was coloured to nature, and had been prepared with great skill. Mr. Hillman also exhibited a case of Hemiptera taken at Epping Forest. Mr. White showed a miniature fern-case, in which had been confined, for upwards of eight months, a common house spider, being fed during the time by hand. It looked very tame and fat, and had spun an immense quantity of white silken web.—W. J. VANDENBURGH, Hon. Sec.

OBITUARY.

THOMAS CHAPMAN.—Thomas Chapman, so well known as an eminent Glasgow Entomologist, died, at the residence of his son, Dr. T. Algernon Chapman, of Burghill, Herefordshire, on August 27th last. Although born in 1816, in Nottingham, he had

lived so long in Scotland as to be reckoned one of its best naturalists. Few amongst those who had the pleasure of his acquaintance but looked up to him as an authority, not only in Entomology, but in several other branches of science. Probably the City of Glasgow Bank failure cut short Mr. Chapman's life, for by its collapse he lost the whole of his means, being, we believe, a trustee for some other person who held shares in it. He will be greatly missed, for his good nature and ability to impart knowledge made for him many friends.—J. T. C.

NOAH GREENING. —It is with much regret we record the death of the well-known lepidopterist, Mr. Noah Greening, of Warrington. He died at his Douglas residence, Isle of Man, on Thursday, 13th November, 1879, aged fifty-eight years. Having had a severe attack of inflammation of the lungs last February he went to Douglas, hoping the climate would suit him. This was to some extent successful, but he had recently an unexpected relapse, which terminated his life. In the death of Mr. Greening the northern entomologists have to lament the loss of one of their best friends. Of exceeding kindly disposition, and a really hard worker, he was ever ready to help his friends with either knowledge or specimens. As a collector of Lepidoptera he had few equals, for, added to his great energy, he had the faculty of seeing at a glance the most minute differences between species. The genus *Eupithecia* received from him great attention, and in the very fine collection of Lepidoptera left by him this genus is exceptionally represented. But few of our readers can turn to their collections without finding something from Mr. Greening, notably *Acidalia contiguaria*, *Agrotis Ashworthii*, &c. Besides being an entomologist Mr. Greening was a good ornithologist, his mounting of birds being exceptionally good. As a sportsman he was a celebrated shot and a good fisherman. His death again reduces the now small number of names of those once living in Lancashire who made the Northern Entomological Society of such repute, we believe four alone surviving. He was buried at Warrington on the Monday following his death, the town which saw his successful rise to fortune through a fortunate invention for weaving wire by steam power. He carried on that manufacture until a few years ago, but latterly his son has conducted his more active business.—J. T. C.



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